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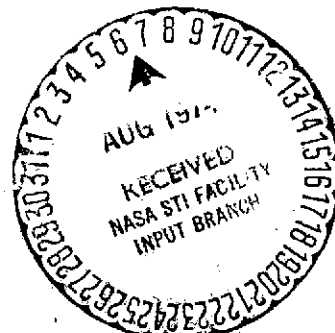
# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY

### WITH INDEXES

### (Supplement 129)

### JUNE 1974



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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 129)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in May 1974 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



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JUNE 1974

12

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 280 reports, articles and other documents announced during May 1974 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes—subject and personal author—are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1974 Supplements.

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## GENERAL AVAILABILITY

All publications abstracted in this bibliography are available to the public through the sources as indicated in the *STAR Entries* and *IAA Entries* sections. It is suggested that the bibliography user contact his own library or other local libraries prior to ordering any publication inasmuch as many of the documents have been widely distributed by the issuing agencies, especially NASA. A listing of public collections of NASA documents is included on the inside back cover.

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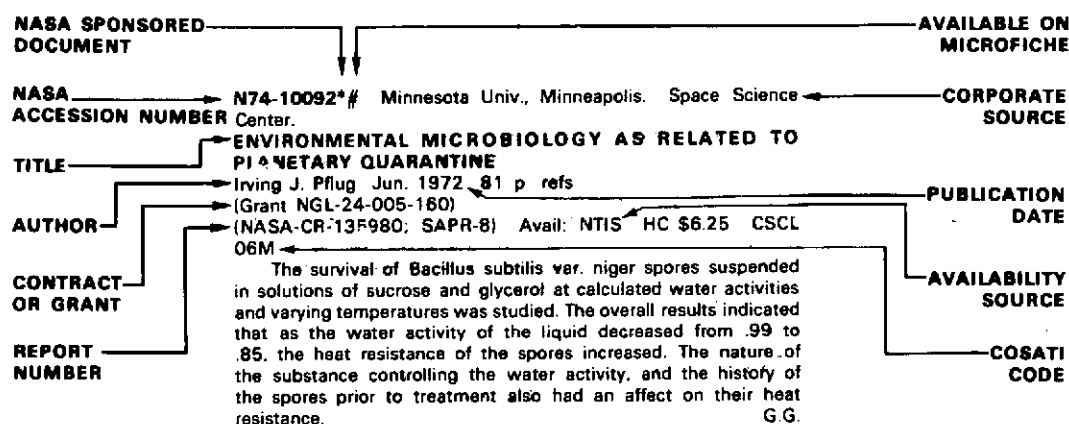
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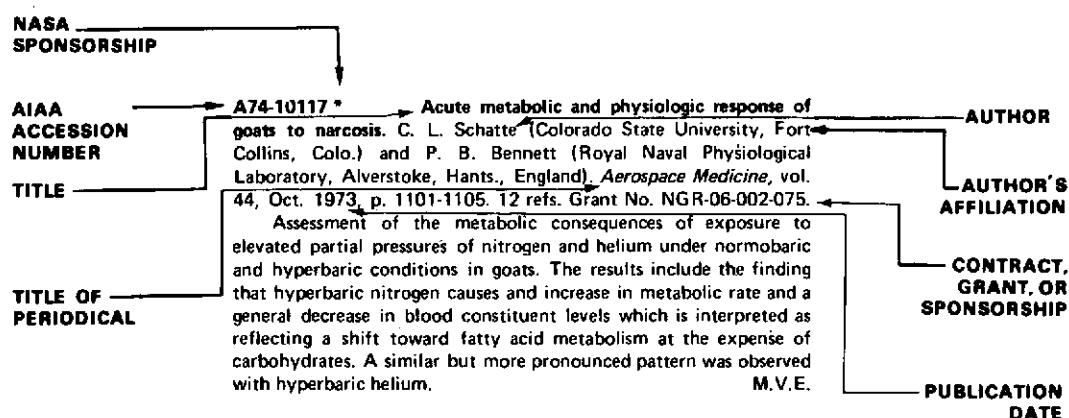
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## TYPICAL CITATION AND ABSTRACT FROM IAA





# AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 129)

JUNE 1974

## IAA ENTRIES

**A74-22387** Influence of the eye on the performance of visual systems. R. Kingslake. In: Applications of geometrical optics; Annual Technical Meeting, 17th, Seminar-in-Depth, San Diego, Calif., August 27-29, 1973, Proceedings. Redondo Beach, Calif., Society of Photo-optical Instrumentation Engineers, 1973, p. 57-64.

Discussion of three particular aspects of the human eye that are pertinent to any optical system in which the eye is the ultimate image receiver. These three aspects of the eye are its dimensional properties, photometric properties, and resolving power. The presently available knowledge about them is shown to be inadequate for determining the optimal design and actual performance of any such optical system, and desirable directions and targets for further research are pointed out. M.V.E.

**A74-22417** # The effect of hippocampus stimulation on the reflex activity of the spinal cord (Vliianie razdrazheniia gippokampa na reflektornuiu deiatel'nost' spinnogo mozga). L. A. Begeladze (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 72, Dec. 1973, p. 649-652. 12 refs. In Russian.

Investigation of the effects of electrical stimulation of the dorsal and ventral hippocampus on the spinal reflex activity in adult cats under chloralose anaesthesia. The obtained results suggest functional differentiation of the dorsal and ventral parts of the hippocampus. M.V.E.

**A74-22418** # Evoked electric spastic activity of the cerebrum during wakefulness and various stages of sleep in animals (Vyzvannaia sudorozhnaia elektricheskaia aktivnost' golovnogo mozga vo vremia bodrstvovaniia i v raznykh stadiakh sna zhivotnogo). Z. I. Nanobashvili and T. K. Ioseliani (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 72, Dec. 1973, p. 653-656. 7 refs. In Russian.

**A74-22419** # More on the influence of nonspecific thalamic nuclei on evoked spindles in the auditory cortex (Eshche raz o vlianii talamicheskikh nespetsificheskikh iader na vyzvannye veretena slukhovoï kory). S. P. Narikashvili, D. V. Kadzhaia, and A. S. Timchenko (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 72, Dec. 1973, p. 661-664. 8 refs. In Russian.

In moderately anesthetized cats, the influence of high frequency stimulation of the thalamic centrum medianum upon spindles evoked by sound clicks in the auditory cortex was investigated. The results indicate that, under the influence of nonspecific impulses, the thalamic phasing mechanism is somewhat disturbed. M.V.E.

**A74-22420** # Ultramicrodetermination of dansyl-derivative 3',5'-adenosine monophosphoric acid in nerve tissue by thin-layer silica gel chromatography (Ul'tramikroopredelenie dansilproizvodnogo 3',5'-AMF v nervnoi tkani metodom tonkosloinoi khromatografii na silikagele). T. A. Dzhalishvili and V. N. Chikvaide (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 72, Dec. 1973, p. 669-671. In Russian.

**A74-22421** # Effect of general X-ray irradiation on the monoaminooxidase activity in various parts of the cerebrum (Vliianie obshchego Rentgenovskogo oblucheniia na aktivnost' monoaminoksidazy v raznykh otdelakh golovnogo mozga). G. K. Goksadze (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 72, Dec. 1973, p. 673-676. 6 refs. In Russian.

**A74-22422** # Structural changes of neurons in nuclei of the anterior part of the hypothalamus during experimental sensitization (Strukturnye izmeneniia neironov v iadrah perednego otdela gipotalamusa pri eksperimental'noi sensibilizatsii). T. A. Churadze, B. R. Naneishvili, and Z. A. Zurabashvili (Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Nauchno-Issledovatel'skii Institut Psikiatrii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 72, Dec. 1973, p. 721-723. In Russian.

**A74-22500** \* Computer-assisted design in perceptual-motor skills research. C. A. Rogers, Jr. (Arizona, University, Tucson, Ariz.). *Perceptual and Motor Skills*, vol. 38, Feb. 1974, p. 87-90. 13 refs. Research supported by Tulane University; Grant No. NGR-03-002-091.

A categorization was made of independent variables previously found to be potent in simple perceptual-motor tasks. A computer was then used to generate hypothetical factorial designs. These were evaluated in terms of literature trends and pragmatic criteria. Potential side-effects of machine-assisted research strategy were discussed. (Author)

**A74-22585** Acoustic visualization technique for the diagnosis of arteriosclerotic diseases. M. Ahmed, R. L. Whitman, A. Korpel (Zenith Radio Corp., Chicago, Ill.), H. Davies, P. Steele (U.S. Veterans Administration Hospital, Denver, Colo.), and F. S. Barnes (Colorado, University, Denver, Colo.). In: Ultrasonics Symposium, U.S. Naval Postgraduate School, Monterey, Calif., November 5-7, 1973, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 10-12. 8 refs.

Recent experiments indicate that acoustic imaging techniques may be used to diagnose and study the development of arteriosclerosis. Sections of diseased and healthy femoral arteries were examined in vitro by the laser-scanned acoustic camera. In one experiment the artery was isolated from the surrounding tissue. In another, a section of the thigh (2 x 4 x 6 in.) containing the artery was examined. In each case, the calcium and cholesterol deposits within the artery were clearly visible. The artifacts normally present with coherent (CW) insonification were eliminated by the use of a

10% frequency sweep, thus demonstrating the utility of polyphonic insonification for obtaining real time acoustic images of thick biological specimens. (Author)

**A74-22586 A directional ratiometric ultrasonic blood flowmeter.** W. C. Haase, W. S. Foleta, and J. D. Meindl (Stanford University, Stanford, Calif.). In: Ultrasonics Symposium, U.S. Naval Postgraduate School, Monterey, Calif., November 5-7, 1973, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 81-85. 8 refs. Grant No. PHS-1-P01-GM-17940-04.

A new type of directional pulsed Doppler ultrasonic blood flowmeter has been developed. The flowmeter utilizes an offset-frequency technique to measure flow direction and realizes a ratiometric measurement of the velocity profile across a blood vessel. The system realizes three advantages over other directional techniques - namely, (1) the system is calibrated and drift-free, requiring no user calibration of either baseline (flow zero) or scale factor; (2) the system affords better accuracy for measurement of low flow velocities; and (3) the system is of particular advantage in situations in which a large forward flow is accompanied by a small reverse flow, as happens in the ascending aorta. (Author)

**A74-22588 Optimal system design of the pulsed Doppler ultrasonic blood flowmeter.** R. W. Gill and J. D. Meindl (Stanford University, Stanford, Calif.). In: Ultrasonics Symposium, U.S. Naval Postgraduate School, Monterey, Calif., November 5-7, 1973, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 88-93. 13 refs. Grant No. PHS-1-P01-GM-17940-04.

The pulsed Doppler blood flowmeter has demonstrated its utility in a number of applications, both clinical and research. The future is certain to see increasing use of this type of flowmeter for several reasons, including its convenience and stability and the unique data it can produce. In the design of the flowmeter a number of tradeoffs must be made. A systematic approach to these tradeoffs is developed, leading to a design procedure which optimizes flowmeter performance for a given set of physiological constraints. Sample designs for typical applications are presented. The particular flowmeter configuration considered is the single-transducer type with the transducer adjacent to the vessel. (Author)

**A74-22625 Microwave radiation hazards.** G. Subrahmanian, P. Gangadharan, M. S. S. Murthy, and J. P. Gupta (Department of Atomic Energy, Directorate of Radiation Protection, Bombay, India). *Defence Science Journal*, vol. 23, July 1973, p. 129-136. 15 refs.

Excessive exposure to microwave radiation could lead to biological damage. The criteria for maximum permissible exposure limits derived from experiments by several countries are discussed. Recommendations made for safety of operating personnel based on a recent protection survey are also presented. (Author)

**A74-22630 # Monitoring of heart failure via seat pad EKG.** C. W. Sem-Jacobsen (EEG Research Institute, Norway). In: Economics of air safety and long-range safety research and development; Proceedings of the Twenty-sixth Annual International Air Safety Seminar, Lisbon, Portugal, November 4-7, 1973. Arlington, Va., Flight Safety Foundation, Inc., 1973, p. 65-70.

It is pointed out that heart failure has caused the incapacitation of some commercial airliner pilots, notably at takeoff and landing, and resulted in more than 300 deaths. A number of accidents due to unknown reasons might have been caused by undiagnosed cardiac break down. A seat pad EKG technique is proposed for monitoring impending heart failure hazard in pilots in order to ward off such accidents. V.Z.

**A74-22793 Biometeorology; Proceedings of the Sixth International Congress, Noordwijk, Netherlands, September 3-9, 1972. Volume 5. Part 2.** Congress sponsored by the International

Society of Biometeorology. Edited by S. W. Tromp (Biometeorological Research Centre, Leiden, Netherlands), W. H. Weihe, and J. J. Bouma. Amsterdam, Swets and Zeitlinger (*International Journal of Biometeorology*, Volume 16, Supplement), 1972. 256 p. Price of two parts, \$36.60.

Near-future prospects of the meteorological environment in the deserts and tropical areas of developing countries are discussed together with near-future prospects of the meteorological environment in developed countries, the significance of biological rhythms in biometeorology, and the effects of weather and climate on behavior, population density, and migration. Other subjects considered are related to telemetry in biometeorological studies and the effects of geophysical, extraterrestrial, and physical stimuli on living organisms.

G.R.

**A74-22795 # Effects of geophysical extra-terrestrial and terrestrial physical stimuli on living organisms - Effects of gravity fields on living organisms.** R. J. F. Saunders (NASA, Office of Live Sciences and Office of Manned Space Flight, Washington, D.C.). In: Biometeorology; Proceedings of the Sixth International Congress, Noordwijk, Netherlands, September 3-9, 1972. Volume 5. Part 2. Amsterdam, Swets and Zeitlinger, 1972, p. 193-216. 55 refs.

The biologic effects of greatly reduced gravity resulting from space flight are examined. Aspects of U.S. space biology during the period from 1960 to 1972 are discussed, giving attention to the Discoverer satellites, the Gemini series, the OV-14 satellite, the biosatellite project, the orbiting frog otolith experiment, and the Apollo program. Other studies considered are related to the effects of galactic particles on nonproliferating cells, a recoverable tissue culture experiment, cell cycle maintenance in human lung cells, and effects of space flight on circadian rhythms. Viking will land on the planet Mars in 1975 in search for life forms. G.R.

**A74-22796 # Effects of atmospheric and extra-terrestrial electromagnetic and corpuscular radiations on living organisms.** R. Reiter (Physikalisch bioklimatische Forschungsstelle, Garmisch-Partenkirchen, West Germany). In: Biometeorology; Proceedings of the Sixth International Congress, Noordwijk, Netherlands, September 3-9, 1972. Volume 5. Part 2. Amsterdam, Swets and Zeitlinger, 1972, p. 217-227. 42 refs.

Biometeorological relationships are considered, taking into account causality and stereotyped reactions. Aspects concerning the relation between the bioclimate and the organism are discussed and attention is given to the question if it is necessary to take atmospheric electrical variables into consideration as components of the bioclimate. Some fundamental problems regarding the appearance of electric fields in the biosphere are explored. Static electric fields and their fluctuations are examined together with artificial electric fields in the spheres of daily life. G.R.

**A74-22797 # Possible effects of extra-terrestrial stimuli on colloidal systems and living organisms.** S. W. Tromp (Biometeorological Research Centre, Leiden, Netherlands). In: Biometeorology; Proceedings of the Sixth International Congress, Noordwijk, Netherlands, September 3-9, 1972. Volume 5. Part 2. Amsterdam, Swets and Zeitlinger, 1972, p. 239-248. 85 refs.

Geophysical effects on living organisms at very high altitude within the atmosphere are explored together with the geophysical effects on living organisms near the surface of the earth. Extra-terrestrial influences on the physical parameters of the atmosphere are examined, taking into account solar and planetary effects and gravity radiation. The possible effects of the physical environment on inorganic and organic colloids are also investigated. G.R.

**A74-22957 \* Evaluations of lunar samples for the presence of viable organisms.** G. R. Taylor (NASA, Johnson Space Center, Health Services Div., Houston, Tex.) and B. C. Wooley (Becton-

Dickinson Research Center, Raleigh, N.C.). In: Lunar Science Conference, 4th, Houston, Tex., March 5-8, 1973, Proceedings. Volume 2. New York, Pergamon Press, Inc., 1973, p. 2267-2274, 12 refs.

Samples from the six successful Apollo lunar exploration missions were examined for the presence of biological formed elements and were used to inoculate a variety of culture media designed to promote growth of a broad spectrum of microorganisms. No evidence of viable organisms was obtained from any of these analyses. Following incubation of the lunar material-culture medium complexes, microbial growth dynamics studies were conducted with known test species to evaluate the possible presence of toxic factors. Only extracts of culture media which had been in contact with a mixture of lunar material from both Apollo 11 core tubes proved to be toxic to all species tested. Attempts to reproduce this toxic effect with individual Apollo 11 core samples obtained at other parts of the core and analyzed under somewhat different conditions were unsuccessful. In all, 48 different lunar samples were examined. These samples were collected at the lunar surface, in trenches, and in core samples to a depth of 297 cm. (Author)

**A74-23167 # Optimization aspects of the cerebro-visceral blood-pressure regulation under the chronic action of combined stressors (Optimierungsaspekte in der zerebro-viszeralen Blutdruck-regulation unter chronischem Einfluss kombinierter Stressoren).** K. Hecht, M. Poppei, M. Peschel, K. Treptow, and V. Moritz (Deutsche Akademie der Wissenschaften, Zentralinstitut für Herz- und Kreislauf-Regulationsforschung, Berlin, East Germany). *Acta Biologica et Medica Germanica*, vol. 31, no. 6, 1973, p. 813-825. 19 refs. In German.

Study of the influence of multiple stressors upon the central nervous activity, blood pressure regulation, and carbohydrate metabolism in albino rats. Whereas chronic single presentation of stressors (e.g., learning, intermittent limitation of mobility) led to pronounced, neurotically induced dysregulations of the blood pressure, with paralleling disturbances of the central nervous system and carbohydrate metabolism, any combination of two stressors or of one stressor with some environmental factor produced compensatory effects observable in any of the investigated parameters. These findings suggest that chronic stresses are not necessarily pathogenic, and that a combination of various environmental stimuli does not necessarily entail a summation of organism responses. M.V.E.

**A74-23168 # Adaptation mechanisms of the cerebral and cardiovascular regulation processes in albino rats subjected to gradually intensified physical training (Adaptationsmechanismen in zerebralen und kardiovaskulären Regulationsprozessen von Albinoratten unter dem Einfluss von stufenweise gesteigertem motorischem Training).** K. Hecht, S. Choinowski, T. Hecht, and L. Shahab (Deutsche Akademie der Wissenschaften, Zentralinstitut für Herz- und Kreislauf-Regulationsforschung, Berlin, East Germany). *Acta Biologica et Medica Germanica*, vol. 31, no. 6, 1973, p. 827-840. 35 refs. In German.

**A74-23169 # Changes in hippocampal single-cell activity induced by emotional and motivational effects of stimuli (Veränderungen der hippocampalen Einzelzellaktivität durch emotionell-motivationell wirksame Reize).** U. Zippel, U. Kolle, and H.-J. Gabriel (Berlin, Humboldt-Universität, Berlin, East Germany). *Acta Biologica et Medica Germanica*, vol. 31, no. 6, 1973, p. 841-851. 47 refs. In German. Research supported by the Ministerium für Wissenschaft und Technik.

Study of the responses of hippocampal neurons in rats trained and nontrained to discriminate between two tones: one positive and the other negative, in terms of emotional and motivational relevance. The significance of the response differences between the two stimuli and between the two groups is discussed. M.V.E.

**A74-23170 # External program control of a laboratory computer for obtaining representative criteria concerning average-evoked potentials (Externe Programmsteuerung eines Laborcom-**

**puters zur Gewinnung repräsentativer Merkmale für average-evoked-potentials).** C. Gurk, H. Baumann, and M. Schauer (Deutsche Akademie der Wissenschaften, Zentralinstitut für Herz- und Kreislauf-Regulationsforschung, Berlin, East Germany). *Acta Biologica et Medica Germanica*, vol. 31, no. 6, 1973, p. 853-861. 5 refs. In German.

The algorithm and implementation technique for the external control of an average computer are described. They are shown to make it possible to combine the evoked-potential averaging process with the derivation of representative criteria for the averaged evoked potentials. An application example is presented for illustration. M.V.E.

**A74-23186 Hoffmann reflex studied in the quadriceps muscle of normal human subjects (Etude du réflexe de Hoffmann obtenu au niveau du muscle quadriceps de sujets humains normaux).** P. Guhenuec and J. Ginot (Nantes, Université, Nantes, France). *Electroencephalography and Clinical Neurophysiology*, vol. 36, Mar. 1974, p. 225-231. 25 refs. In French.

The femoral nerve, just below the inguinal ligament, of eighteen normal human subjects was stimulated by monopolar electrical shock. Two successive responses in the quadriceps were recorded. The second response has a biphasic shape, a threshold lower than that of the direct motor response, and a mean latency of 14.6 plus or minus 0.95 msec. The recruitment curve, the double shock excitability curve, and the facilitatory and inhibitory effects of peripheral stimulation are identical to those of the Hoffmann reflex evoked in the soleus muscle. It is concluded that the longer latency response of the rectus femoris is a monosynaptic reflex response. P.T.H.

**A74-23187 Evolution during the night of REM sleep in man.** O. Benoit, S. Parot, and L. Garma (Institut National de la Santé et de la Recherche Médicale, Paris, France). *Electroencephalography and Clinical Neurophysiology*, vol. 36, Mar. 1974, p. 245-251. 19 refs.

The temporal organization of periods of sleep with rapid eye movements (REM) was studied during night sleep in ten normal human subjects. The duration (D) of each period, the number of movements (N) in each period, and the frequency (F equals N/D) of the movements of a given period were recorded. The REM period position was grouped by its rank (R) and by the time which separated it from the onset of sleep - i.e., its latency (T). A significant relationship was found between the log of T and the log of N and D. On the whole, the dependence of N, both upon D and T, explains 95 per cent of its variance. P.T.H.

**A74-23188 Sleep cycle content and sleep cycle duration.** V. Brezinova (Royal Edinburgh Hospital, Edinburgh, Scotland). *Electroencephalography and Clinical Neurophysiology*, vol. 36, Mar. 1974, p. 275-282. 26 refs.

The hypothesis that the NREM-REM (nonrapid eye movement/rapid eye movement) sleep cycle is sleep-independent - i.e., the content of the sleep cycle should not influence its duration - was tested by comparing the sleep cycle patterns of a group of normal human subjects whose sleep was interrupted with those of a group whose sleep was intact. It is found that an interruption actually extends the duration of the period in which it occurs, and it is concluded that the onset of the REM period is not a strictly time-locked phenomenon. P.T.H.

**A74-23189 Effects of decreased adrenal corticosteroids - Changes in sleep in normal subjects and patients with adrenal cortical insufficiency.** J. C. Gillin (National Institute of Mental Health, Laboratory of Clinical Psychopharmacology, Washington, D.C.), L. S. Jacobs (Kalihi Palama Mental Health Center, Honolulu, Hawaii), F. Snyder (National Institute of Mental Health, Laboratory of Clinical Psychobiology, Bethesda, Md.), and R. I. Henkin (National Heart and Lung Institute, Bethesda, Md.). *Electroencephalography and Clinical Neurophysiology*, vol. 36, Mar. 1974, p. 283-289. 20 refs.

**A74-23190** An application of factorial analysis to the study of EEG structure (Application de l'analyse factorielle à l'étude de la structure de l'EEG). M. Defayolle and J. P. Dinand (Ministère des Armées, Service de Santé des Armées, Lyons, France). *Electroencephalography and Clinical Neurophysiology*, vol. 36, Mar. 1974, p. 319-322. 8 refs. In French.

A method of factor analysis of basic EEG frequency spectra is described which yields a considerable reduction of data. Four factors are identified and account for 87 per cent of the information contained in the correlation matrices between frequencies. Several indices are suggested, including the gross electrogenesis, the factorial scores, and the mean frequency of the bands to which the factors correspond. P.T.H.

**A74-23247 #** Biological interaction of electromagnetic RF waves and ionizing radiation (Biologicheskoe vzaimodeistvie elektromagnitnykh voln diapazona radiochastot i ioniziruiushchei radiatsii). B. I. Davydov, V. V. Antipov, and V. S. Tikhonchuk. *Kosmicheskie Issledovaniia*, vol. 12, Jan.-Feb. 1974, p. 129-133. 17 refs. In Russian.

A total of 2560 female mice were exposed to 12.6-cm radiation at 10, 20, 40, or 100 mW/sq cm for 40, 20, 10, and 4 min, respectively, for a period of ten days, with subsequent bombardment by gamma doses of 400 to 900 or 1000 to 20,000 r at 25 r/min and 300 r/min, respectively, after each radiation exposure series. Survival duration and rates, weight dynamics, and leucocyte abundance variations were studied in the mice. Synergism of combined electromagnetic and ionizing radiations was established at radiation doses causing hematological death and the absence of synergism under radiation doses attacking the gastrointestinal tract. V.Z.

**A74-23320** Detection of formaldehyde in external galaxies. F. F. Gardner and J. B. Whiteoak (Commonwealth Scientific and Industrial Research Organization, Div. of Radiophysics, Sydney, Australia). *Nature*, vol. 247, Feb. 22, 1974, p. 526, 527.

The detection of formaldehyde absorption in the galaxies NGC253 and NGC4945 is reported. The observations were made in early November 1973 with the Parkes 64-m telescope equipped with a 6-cm cryogenic parametric amplifier and a 512-channel autocorrelator. For both galaxies the formaldehyde absorption profiles are easily distinguishable. For NGC253 the formaldehyde absorption, which has a maximum antenna temperature of 0.012 K, probably occurs against the nuclear continuum component. G.R.

**A74-23340** Red cell production - An enigma clarified (La production des globules rouges - Une énigme élucidée). S. B. Krantz and L. O. Jacobson. *La Recherche*, vol. 5, Mar. 1974, p. 276-278. In French.

The production of red cells depends on an inductor present in the plasma: erythropoietin. Studies are reported which were carried out, in general, with enriched fractions of plasma of anemic animals, and it is extremely difficult to determine if all the effects observed are due to a direct effect of the erythropoietin or to an indirect effect produced by the associated proteins. In fact, various methods of approach and different sources of erythropoietin have given convergent results. F.R.L.

**A74-23341** The cause-effect relationship between recent coronary artery occlusion and acute myocardial infarction. I. Chapman. *American Heart Journal*, vol. 87, Mar. 1974, p. 267-271. 24 refs.

It has been claimed that a number of studies show the absence of a cause-effect relationship between recent coronary artery occlusion and acute myocardial infarction. The studies are supposed to indicate that infarct precedes and precipitates the associated arterial thrombus. The major arguments submitted to support this opinion are examined. It is found that the arguments contain critical flaws. In addition, it is shown that the proposed hypothesis of primary infarct with subsequent thrombus cannot explain certain consistent anatomic findings which indicate that the coronary artery occlusion precedes and causes the associated myocardial infarct. G.R.

**A74-23342** Systolic time intervals during submaximal and maximal exercise in man. J. T. Maher, G. A. Beller, B. J. Ransil, and L. H. Hartley (U.S. Army, Research Institute of Environmental Medicine, Natick; Boston City Hospital, Boston, Mass.). *American Heart Journal*, vol. 87, Mar. 1974, p. 334-342. 35 refs. Grant No. NIH-RR-76.

The serial responses of the systolic time intervals (STI) to submaximal and maximal supine exercise in normal subjects are described. It is found that within the heart rate range from 120 to 170 beats per minute, total electromechanical systole and left ventricular ejection time are related inversely and linearly to heart rate for both levels of exercise. The study shows also that STI obtained during exercise cannot be corrected for heart rate according to regression equations which were developed in resting supine subjects. G.R.

**A74-23378 #** Image memory study in lower monkeys without behavioral constraints (Issledovanie obraznoi pamiati u nizshikh obez'ian v svobodnom povedenii). I. S. Beritashvili, A. N. Bakuradze, and A. I. Kats (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 5, Jan.-Mar. 1974, p. 3-16. 57 refs. In Russian.

Experiments on 15 baboon monkeys in a large room allowing free motion showed that the animals memorized food images for 60 to 150 min., depending on the state of their attention, after a simple visual exposure. Food image memorization and search reflex imprints persisted in individual animals for periods from several days to beyond 7.5 months after single food exposures involving vision, hearing, taste, kinesthetics, and the vestibular apparatus. V.Z.

**A74-23379 #** Biochemical self-regulation mechanism of a cholinergic mediatory process (Biokhimicheskii mekhanizm samo-regulatsii kholinergicheskogo mediatornogo protsessa). T. M. Turpaev and T. G. Putintseva (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 5, Jan.-Mar. 1974, p. 17-47. 206 refs. In Russian.

Evidence for the presence of a biochemical self-regulation mechanism in a mediatory process of neural stimulus transmission from nerve endings to efferent cells is indicated by an analysis of extensive available data on neural stimulus transmission activity. It is shown that a mediatory chain process in the myocardium, due to the activity of the parasympathetic nerve or caused by acetylcholine administration, results in a changed macroergic substance metabolism in the myocardium. This leads to the liberation of the X-factor, a substance related to uridin-polyphosphates which both stimulates the cardiac activity and inhibits the action of acetylcholine on the myocardium. V.Z.

**A74-23380 #** Hypothalamic regulation mechanisms of adenohypophysis functions (Mekhanizmy gipotalamicheskoi regulatsii adenogipofizarnykh funktsii). B. V. Aleshin (Meditsinskii Institut, Kharkov, Ukrainian SSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 5, Jan.-Mar. 1974, p. 48-81. 272 refs. In Russian.

Review of studies concerning the role of the hypothalamus in adenohypophyseal hormopoiesis control. The topics include the conception of a single hypothalamo-hypophyseal neuro-secretory system; phenomena challenging that conception; secretory elements of the adenohypophyseal zone; and the participation of positive neurosecretory cells of the anterior hypothalamus in adenohypophyseal hormopoiesis control. It is concluded that the supraoptical nucleus plays only a secondary role in hormone production and secretion control in the anterior portion of the hypophysis. V.Z.

**A74-23460 \*** Dynamic optometer. D. C. Wilson (California, University, Berkeley, Calif.). *Optical Society of America, Journal*, vol. 64, Feb. 1974, p. 235-239. 16 refs. NIH-NASA-supported research.

A dynamic optometer that electronically records the position of the anterior surface of the human lens is described. The geometrical optics of the eye and optometer, and the scattering of light from the lens, are closely examined to determine the optimum conditions for adjustment of the instrument. The light detector and associated electronics are also considered, and the operating conditions for obtaining the best signal-to-noise ratio are determined. (Author)

**A74-23466 #** Certain results of medicobiological studies performed according to the Gemini and Apollo programs - Changes in astronaut efficiency (Nekotorye rezul'taty mediko-biologicheskikh issledovaniy vypolnennykh po programmam 'Dzhemini' i 'Apollon' - Izmnenie rabotosposobnosti kosmonavtov). V. I. Kopanov and E. M. Iuganov. *Akademiia Nauk SSSR, Izvestiia, Seriya Biologicheskaja*, Jan.-Feb. 1974, p. 5-20. 48 refs. In Russian.

Review of the literature on psychosensory reactions of astronauts to the carrying out of flight programs and on the results of postflight investigations of the condition of the astronauts by means of various tests. It is noted that certain astronauts showed signs of decreased efficiency during the course of space flights. One of the causes of such decreased efficiency is motion sickness. The instances in which this occurred are cited, and various opinions regarding the physiological mechanisms of development of motion sickness in space are reviewed. Other disturbances reported by astronauts were feelings of hunger, visual disorders, and spatial disorientation. Certain problems connected with the prevention of the unfavorable effect of space flight factors on the human organism are discussed. A.B.K.

**A74-23467 #** Effect of the daily rhythm on the supra-molecular DNA structure in the lymphoid organs of rats (Vliianie sutochnogo ritma na nadmolekuliarnuiu strukturu dezoksiribonukleinovoi kisloty limfoidnykh organov krysa). F. T. Guseinov, G. S. Komolova, I. A. Egorov, V. A. Struchkov, and Iu. P. Druzhinin (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriya Biologicheskaja*, Jan.-Feb. 1974, p. 56-60. 25 refs. In Russian.

**A74-23468 #** Chemical composition of tissue preparations and the possible role of their components in the stimulation of a recovery process in a damaged myocardium (O khimicheskoi sostave tkanevykh preparatov i vozmozhnoi roli ikh komponentov v stimulatsii vosstanovitel'nogo protsessa v povrezhdennoi myshtse serdtsa). I. E. Sadokova (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriya Biologicheskaja*, Jan.-Feb. 1974, p. 61-72. 44 refs. In Russian.

**A74-23469 #** High vacuum stability of *Nadsoniella nigra* var. *Hesuelica* (Ustoichivost' nadsoniella nigra var. Hesuelica k deistviu glubokogo vakuuma). A. A. Imshenetskii, S. V. Lysenko, S. P. Liakh, and V. F. Udovenko (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriya Biologicheskaja*, Jan.-Feb. 1974, p. 125-127. 5 refs. In Russian.

**A74-23498** The physiological clock: Circadian rhythms and biological chronometry /3rd revised edition/. E. Bünning (Tübingen, Universität, Tübingen, West Germany). London, English Universities Press, Ltd.; New York, Springer-Verlag New York, Inc. (Heidelberg Science Library. Volume 1), 1973. 266 p. 1163 refs. Translation. \$7.80.

This book, an updated English edition of a book originally published in 1958 in German, deals with the endogenous diurnal rhythm of physiological processes in plants and animal organisms, covering factors and mechanisms associated with such oscillations during the day. Among the topics discussed are the anatomy of cells and organs; light, darkness and temperature as initiating stimuli; kinetic analysis and models of circadian rhythms and biological chronometry; environmental adjustment of diurnal physiological cycles; and relations between circadian, tidal and lunar rhythms. Attention is also given to the uses of the physiological clock in direction finding and day length measurement, to diurnal physiological fluctuation in response to external factors and to pathological phenomena. V.Z.

**A74-23527** The first polyimide-fiberglass bump protective helmet for astronaut crews in the NASA Skylab program. E. F. Bushman and J. A. Van Haastert (Sierra Engineering Co., Sierra Madre, Calif.). In: Survival and Flight Equipment Association, Annual Symposium, 11th, Phoenix, Ariz., October 7-11, 1973, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1974, p. 9-11.

The objectives of experiment M509 are to: demonstrate Astronaut Maneuvering Unit flying qualities and piloting capability; test and evaluate system response; and relate the data and experience gained to ground based analysis, future AMU design requirements, and projected EVA capabilities. During these experiments, the Astronauts will be protected with helmets against the potential dangers of impact within the confines of the Space Lab. The 2.5 pound helmet is heat resistant, fire safe and nongassing through the use of exotic materials, such as polyimide-fiberglass, polybenzimidazole (PBI) fibers, fluorel elastomers, etc. Special fabrication methods had to be developed for the production of the 'Bump Protective Hat.' (Author)

**A74-23539** The Heated Water Source. R. L. Bell and D. N. DeSimone (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). In: Survival and Flight Equipment Association, Annual Symposium, 11th, Phoenix, Ariz., October 7-11, 1973, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1974, p. 74-77.

The NAVAIRDEVCCEN has developed an improved prototype source of heat and electrical energy for the purpose of heating a water and anti-freeze solution, and circulating the solution through a closed loop liquid circulation garment worn by an airman downed in a low temperature environment. This latest prototype differs from previous prototypes, in that it has the additional capability of simultaneously producing electrical power for the operation of a survival radio, and also its size has been reduced to approximately 100 cubic inches and 3.7 pounds. The device called the Heated Water Source, is propane fueled and utilizes thermoelectric modules in order to generate sufficient electrical energy to pump the heated solution through the garment, and to power the survival radio in lieu of batteries. Subjective tests, with the prototype under realistic low temperature conditions, have demonstrated the feasibility of the concept. (Author)

**A74-23545** Physiological evaluation of the protective capacity of the prototype MBU-8/P military passenger oxygen mask. E. B. McFadden, D. deSteiguer, and J. M. Simpson (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). In: Survival and Flight Equipment Association, Annual Symposium, 11th, Phoenix, Ariz., October 7-11, 1973, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1974, p. 98-101. 7 refs.

Review of the procedures used and results obtained in the evaluation of the protective capacity of the prototype MBU-8/P military passenger oxygen mask. The results demonstrate an adequate capability to maintain human subjects in an acceptable physiological condition for limited exposures to 40,000-foot altitudes. M.V.E.

**A74-23547** Quality assurance - A necessity for life support and life sustaining equipment. F. X. Murray (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). In: Survival and Flight Equipment Association, Annual Symposium, 11th, Phoenix, Ariz., October 7-11, 1973, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1974, p. 106, 107.

Three types of test programs are reviewed that have been adopted for controlling the quality of emergency lifesaving equipment. Following a definition of quality assurance as it applies to naval aircrew life support equipment, the merits of current qualification-testing, first-article test, and production-lot testing procedures are discussed. M.V.E.

**A74-23624** Astronomical aspects of interstellar communication. S. von Hoerner (National Radio Astronomy Observatory, Green Bank, W. Va.). (*International Astronautical Federation, International Astronautical Congress, 23rd, Vienna, Austria, Oct. 8-15, 1972.*) *Astronautica Acta*, vol. 18, Dec. 1973, p. 421-430. 22 refs.

Detailed analysis of the possibility of the existence of intelligent life on other planets in spite of our inability to observe it. An estimate is made of the frequency with which habitable planets might occur and of the number of habitable planets theoretically present in our Galaxy, as well as of the number of planets with a technical civilization capable of emitting signals that could be detected by observers on earth. Also considered is the distance required for communication between neighboring technical civilizations. The presence of a large number of organic molecules in interstellar space is noted, which thus increases the likelihood that life can have formed elsewhere in the Galaxy. If there is a significant probability of life occurring elsewhere in the Galaxy, why then, have no signs of it been detected by observers on earth. The answer to this question is thought to lie in the possibility that surviving civilizations may have undergone a change of interest - i.e., a change from a purely technical orientation to a nontechnical one, as a result of which their activities are not of a type that can be detected by us. This change of interest may have come about as a result of a need for stabilization in the face of severe crises generated by an overemphasis on technology.

A.B.K.

**A74-23625** Status of biological aspects of the modern CETI problem. L. M. Mukhin (Akademiia Nauk SSSR, Institut Kosmicheskikh Issledovaniy, Moscow, USSR). (*International Astronautical Federation, International Astronautical Congress, 23rd, Vienna, Austria, Oct. 8-15, 1972.*) *Astronautica Acta*, vol. 18, Dec. 1973, p. 451-454. 15 refs. Translation.

Biological aspects of communications with extraterrestrial intelligence (CETI) are examined in the general framework of the universal chemistry of life. An analysis of the distribution of main organogenic elements indicates that the composition of living matter is closer to that of the Universe as a whole rather than that of the Earth's crust. The properties of silicon are discussed to substantiate arguments against life based on this element instead of carbon. The possibility for the existence of life on wandering planets that are not tied with any stellar body are examined in terms of expected ambient conditions and sources of energy.

T.M.

**A74-23641** # Heart debility due to extended hypodynamia (*Detrenirovannost' serdtsa pri dlitel'noi gipodinamii*). I. G. Krasnykh. *Voenna-Meditsinskii Zhurnal*, Dec. 1973, p. 54-56. In Russian.

Changes in heart size, blood stroke volume, heart contraction function, and systole and diastole periods were studied in 20 healthy male subjects confined to bed with and without daily physical exercises, or confined in a small chamber with motion constraints, for a period of 30 days. Reductions of heart size and blood stroke volume were largely in evidence after the hypodynamia and required a considerable period of time for restoration of normal conditions.

V.Z.

**A74-23642** # Etiology and prophylaxis of vestibular disorders in flying personnel (*Etiologiya i profilaktika vestibuliarnykh rasstroystv u letnogo sostava*). S. S. Markarian and I. A. Sidel'nikov. *Voenna-Meditsinskii Zhurnal*, Dec. 1973, p. 56-59. 8 refs. In Russian.

Various types of special physical training and gymnastic exercises are given credit as effective prophylactic measures against the development of vestibular conditions in flying personnel. Considered very effective is mixed active-passive training of the vestibular analyzer consisting of active head and trunk motions combined with the action of Coriolis forces in a rotating armchair. Recommendations and directions are given as to how this type of training should be carried out with maximum effect.

V.Z.

**A74-23643** # Visual acuity determination by means of optokinetic nystagmus (*Opredelenie ostroty zreniya s pomoshch'yu optokineticheskogo nistagma*). N. N. Guseinov. *Voenna-Meditsinskii*

*Zhurnal*, Dec. 1973, p. 64-66. In Russian.

A special apparatus was used for obtaining an optokinetic nystagmus for visual acuity measurements in subjects observing movable tables with white-and-black chessboard squares at distances of 3.2 or 5.0 m. Good agreement is obtained between this method and the conventional method of visual acuity examinations. A listing of visual disorder diagnoses made on the apparatus is included. V.Z.

**A74-23696** # Ionizing radiations of the biosphere (*Ioniziruiushchie izlucheniia biosfery*). L. A. Pertsov. Moscow, Atomizdat, 1973. 288 p. 603 refs. In Russian.

An attempt is made to summarize the mechanisms of formation of ionizing radiations and to systematize the nature of their interaction with animal and plant life. A number of findings are described which reflect the patterns of formation of natural radiative loads on plants, animals, and human beings, and factors causing fluctuations of these loads are indicated. The effect of current scientific progress on shifts in the radiation field components is considered. The concept of a radiation background is introduced, and a classification of the radiation backgrounds of various types of landscapes is developed. Data are presented concerning the radioactivity of the components of the environment, and of plant, animal, and human tissue. An analytical survey is made of the potential sources of radioactive contamination of the biosphere, and an estimate is made of the degree of danger of probable uncontrollable influxes of radionuclides into the environment. The mechanism of their propagation in air, in rivers, in soil, and along biotic chains is considered.

A.B.K.

**A74-23741** Effect of carbon monoxide and peroxyacetyl nitrate on man's maximal aerobic capacity. P. B. Raven, B. L. Drinkwater, R. O. Ruhling, N. Bolduan, S. Taguchi, J. Gliner, and S. M. Horvath (California, University, Santa Barbara, Calif.). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 288-293. 32 refs. Research supported by the California State Air Resources Board.

Metabolic, temperature, and cardiorespiratory responses of 20 healthy males (10 smokers and 10 nonsmokers) were monitored while working to their maximum and breathing four different gas mixtures at 25 plus or minus 0.5 C and relative humidity of 20 plus or minus 2%. The four gas mixtures were filtered air (FA), 50 ppm carbon monoxide in filtered air (CO), 0.27 ppm peroxyacetyl nitrate in filtered air (PAN), and a combination of all three mixtures (PANCO). Some minor and transient alterations were found in the initial stages of work regarding ventilatory efficiency when breathing 50 ppm carbon monoxide. Smokers had significantly higher resting carboxyhemoglobin levels than nonsmokers (3.17 and 0.64%, respectively), which remained greater following exercise even when exposure gas mixtures were CO and PANCO. Increases in carboxyhemoglobin levels of smokers during the CO and PANCO exposures were observed. Nonsmokers had greater vital capacities and maximum breathing capacities than the smokers, yet there were no differences in obtained maximum aerobic capacity.

(Author)

**A74-23742** Regional lung function in natives and long-term residents at 3,100 m altitude. A. Dawson (Scripps Clinic and Research Foundation, La Jolla, Calif.) and R. F. Grover (Colorado, University, Denver, Colo.). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 294-298. 17 refs. Grants No. NIH-HL-10009; No. NIH-HL-08728; No. NIH-HL-14985.

To see whether the pulmonary hypertension of high-altitude residents is associated with a change in regional lung function, regional ventilation and perfusion in the sitting position were measured using xenon 133 in 17 healthy adult residents of Leadville, Colo. (altitude 3100 m). Of these, five were natives and lifelong residents of Leadville, nine were nonnatives who had lived in Leadville more than 1 yr, and three were natives whose residence had been interrupted. The results were compared with data from 11 normal lowlanders studied at sea level. Ventilation distribution was similar in high-altitude and sea-level residents. The apex-to-base

perfusion gradient was significantly less (i.e., perfusion was more uniform) in Leadville natives than in nonnative Leadville residents whose perfusion gradient was not significantly different from that of normal sea-level subjects. Relative regional ventilation/perfusion was significantly more uniform in both native and nonnative Leadville residents than in normal subjects at sea level. (Author)

**A74-23743** Hepatic and renal gluconeogenesis in rats acclimatized to high altitude. L. C. Ou (Dartmouth College, Hanover, N.H.). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 303-307. 47 refs. Grant No. NIH-HL-02888-16.

Hepatic and renal gluconeogenesis were studied in rats chronically exposed to an altitude of 18,000 ft. The gluconeogenic capacity of renal cortex slices increased gradually, eventually reaching 170% of the control value with lactate and 180% with pyruvate as substrate, after 3 months of exposure. In contrast, the activities of the key gluconeogenic enzymes of the liver was markedly reduced in rats exposed to high altitude for 3 months. The argument is advanced that hepatic gluconeogenesis may be depressed as a result of a functional derangement of the liver resulting from exposure to the hypoxic environment. The reduced liver glycogen and blood glucose of the chronically exposed rats observed in this study may result from an alteration of the overall gluconeogenic capacity at high altitude. (Author)

**A74-23744** Efficiency of evaporative cooling from wet clothing. F. N. Craig and J. T. Moffitt (U.S. Army, Biomedical Laboratory, Aberdeen Proving Ground, Md.). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 313-316. 13 refs.

Two men wearing fatigue clothing walked on the treadmill and stored heat at rates of from -14 to +121 W/sq m. Twenty-one tests were made to relate the efficiency of evaporative cooling, E/E prime, to the water content of the clothing, D. The heat lost from the body by evaporation, E, was obtained from the equation  $E = M + R + C - S$ , where storage was determined from changes in skin and rectal temperatures, and metabolism, radiation, and convection were estimated. The total heat of evaporation, E prime, was determined from the change in clothed body weight. As D increased there was little change in M, R, and C, but E prime increased more than E and the increase in E was counterbalanced by a decrease in S. The approach of E/E prime to unity at minimum values of D supported the validity of the estimate of M, R, and C. (Author)

**A74-23745** Static and dynamic properties of excised cat lung in relation to temperature. T. Horie, R. Ardila, and J. Hildebrandt (Virginia Mason Research Center, Seattle, Wash.). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 317-322. 20 refs. Grant No. NIH-HL-14854.

A search was made for certain effects of temperature in excised cat lungs on: pressure-volume (P-V) curves; stress adaptation; and slow dynamic compliance (Cdyn). Compared to 22 C, elastic recoil during air deflation at 37 and 47 C was altered only slightly (lower in the upper third of the lung volume). At 47 C, the inflation pressure was reduced uniformly by approximately 3 cm H2O. Saline curves at 37 C were unchanged; however, they were not obtainable at 47 C. Changes of pressure while volume was held fixed with air were slightly accelerated at 37 C but only on the deflation limb (as were changes of Cdyn), but at 47 C rates of adaptation were again similar to these at 22 C. At both 22 and 37 C the tissue component contributed 0.2 to 0.25 of total lung stress adaptation, and about 0.1 of total change of Cdyn. P-V characteristics of excised cat lungs in relation to temperature are only partially consistent with properties of lung extracts. (Author)

**A74-23746 \*** Effect of bed rest and exercise on body balance. R. F. Haines (NASA, Ames Research Center, Neurosciences Branch, Moffett Field, Calif.). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 323-327. 26 refs.

A battery of 11 body balance tests was administered to 7 men

before and after 14 days of bedrest. Seven men who had not undergone bed rest served as controls. During bed rest, each subject underwent daily either isotonic, isometric, or no leg exercise. The results showed that, for the bed-rested no exercise, isotonic exercise, and isometric exercise groups, 2 weeks of bed rest produces significant body balance decrements on 3, 4, and 5 of the 11 tests, respectively. Daily leg exercise did not prevent the debilitating effects of bed rest on body balance. After bed rest, balance skill was relearned rapidly so that in most tests, performance had reached prebed-rest levels by the third recovery day. These data suggest that balance impairment is not due to loss of muscular strength in the legs but, perhaps, to a bed-rest-related change in the neurally coded information to postural control centers. (Author)

**A74-23747 \* #** Effects of positive acceleration (+Gz) on renal function and plasma renin in normal man. M. Epstein, S. J. Shubrooks, Jr., L. M. Fishman, and D. C. Duncan (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; Miami, University; U.S. Veterans Administration Hospital, Miami, Fla.). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 340-344. 24 refs. Contract No. F41609-72-C-0002; Grant No. NGR-10-007-097.

The effects of positive radial centrifugation (+Gz) on plasma renin activity (PRA) and renal function were assessed in 15 normal male subjects under carefully controlled conditions of Na, K, and water intake. Twenty minutes of +2.0 Gz resulted in significant decreases in the mean rate of sodium excretion and creatine clearance and in a doubling of PRA in seven sodium-depleted subjects (10 meq Na intake). In eight sodium-replete subjects (200 meq Na intake), 30 min of +2.0 Gz was also associated with a decrease in the mean rate of sodium excretion. As a consequence of a concurrent decrease in creatine clearance, the fractional excretion of sodium during centrifugation did not differ from control, suggesting that the changes in Na excretion were mediated primarily by renal hemodynamic factors, although enhanced renal tubular sodium reabsorption may also have played a role. (Author)

**A74-23748 \* #** Effects of an anti-G suit on the hemodynamic and renal responses to positive (+Gz) acceleration. S. J. Shubrooks, Jr., M. Epstein, and D. C. Duncan (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; Miami, University; U.S. Veterans Administration Hospital, Miami, Fla.). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 345-349. 23 refs. Contract No. F41609-72-C-0002; Grant No. NGR-10-007-097.

The effects of the currently used U.S. Air Force (CSU-12/P) anti-G suit on renal function during positive radial acceleration (+Gz) were assessed in seven normal male subjects in balance on a 200 meq sodium diet. Following suit inflation in the seated position, +2.0 Gz for 30 min resulted in a decrease in the rate of sodium excretion from 125 plus or minus 19 to 60 plus or minus 14 microeq/min, which persisted during a 25-min recovery period. Fractional excretion of sodium also decreased significantly during +Gz. The magnitude of the antinatriuresis was indistinguishable from that observed during +Gz without suit inflation. In contrast to the antinatriuresis observed during centrifugation without suit, however, the antinatriuresis with suit was mediated primarily by an enhanced tubular reabsorption of sodium. (Author)

**A74-23749** Airway resistance - A fluid mechanical approach. M. Y. Jaffrin and P. Kesic (MIT, Cambridge, Mass.). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 354-361. 28 refs. NSF Grant No. GK-31206.

Pressure-flow measurements during inspiration reported on the literature for different gases can be successfully correlated on a universal curve by using dimensional analysis. Two trends emerge from this correlation: at very low flow rates or for low-density gases, the airway resistance at any given lung volume is independent of flow; at very large flow rates or for heavy gases, it tends to become

proportional to the flow rate. Rohrer's equation is interpreted as an empirical attempt to describe the transition between the two regimes. Laws of similitude are given which permit extrapolation of the results from one gas to another and allow a determination of lung tissue resistance. A mathematical model of the flow in the airways below the larynx is presented which fits published data and confirms the major contribution of large airways up to generation 6 or 7 to the resistance. (Author)

**A74-23750**      **Reduction of maximal exercise heart rate at altitude and its reversal with atropine.** L. H. Hartley, J. A. Vogel, and J. C. Cruz (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; Universidad Peruana, Lima, Peru). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 362-365. 12 refs.

This study was performed to determine if parasympathetic nervous activity contributes to the decrement in maximal heart rate which occurs at high altitude. Five normal male subjects were studied during submaximal and maximal bicycle exercise at their native sea-level location and later at 4600 m altitude. A mean reduction in maximal heart rate of 24 beats/min occurred at altitude which was associated with a 26% decrease in maximal O<sub>2</sub> uptake. Intravenous atropine increased the maximal heart rate of all subjects, and the group changed by a mean of 11 beats/min. Since atropine in doses which completely block the parasympathetic nervous system does not affect maximal heart rate at sea level, these results support the hypothesis that parasympathetic nervous activity contributes to the reduction in maximal-exercise heart rate which occurs at altitude. (Author)

**A74-23751**      **A new approach to quantitation of whole nerve bundle activity.** D. E. Dick, J. R. Meyer, and J. V. Weil (Colorado, University, Denver and Boulder, Colo.). *Journal of Applied Physiology*, vol. 36, Mar. 1974, p. 393-397. 10 refs. Research supported by the Colorado Heart Association.

It is theoretically demonstrated that the variance of the amplitude of signals recorded from whole nerve bundles should provide an excellent index of whole nerve bundle traffic, reflecting changes in both frequency of firing and fiber recruitment in a direct and linear fashion. Using an analog computer, a whole nerve bundle preparation was simulated, and it was shown that the amplitude variance of the signal did, indeed, reflect changes in frequency and in fiber recruitment in a direct and linear fashion. Hence the analog simulation tended to verify the predictions of the theoretical construct. Data arising from the application of this technique to the measurement of the neural output of a chemoreceptor, the carotid body, are shown as an illustration of the usefulness of this technique in a physiological setting. (Author)

**A74-23913 #**      **Neocortical and archicortical functional hippocampus connections in monkeys (Neokortikal'nye i arkhikortikal'nye funktsional'nye svyazi gippokampa u obez'ian).** G. A. Khasabov (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Jan. 1974, p. 3-10. 21 refs. In Russian.

In wakeful monkeys with brain-implanted electrodes, the evoked responses to single electrical stimuli applied to the hippocampus were investigated in the neocortex, and in the contralateral and ipsilateral hippocampus. The observed functional heterogeneity of neocortical and commissural connections of the hippocampus are discussed. M.V.E.

**A74-23914 #**      **The interaction of excitation and inhibition in the neuronal responses of the superior colliculus to moving visual stimuli (Vzaimodeistvie vozbuzhdeniia i tormozheniia v otvetakh neuronov verkhnego dvukholmiia na dvizhushchiesia zritel'nye stimuly).** A. M. Mass (Akademiia Nauk SSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Jan. 1974, p. 17-24. 15 refs. In Russian.

**A74-23915 #**      **Effects of physical loads on the 'accelerated' cold adaptation in animals (Vliianie fizicheskikh nagruzok na 'uskorennoi' adaptatsiiu zhivotnykh k kholodu).** Iu. I. Bazhenov (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Jan. 1974, p. 94-98. 16 refs. In Russian.

Daily, 10-min long exposures of rats to -20 C for ten days increased the organism's resistance and decreased the reaction of muscles to the cold. The inclusion in this 10-day cold adaptation period of daily physical workloads weakened the cold adaptation effects, particularly when the work preceded the exposure. M.V.E.

**A74-23916 #**      **The mechanism of the regulation of ion and water transport in muscles during physical exercise (O mekhanizme regulatsii transporta ionov i vody v myshitsakh pri fizicheskikh nagruzkakh).** P. K. Kyrge and S. Ia. Roosson (Tartuski Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Jan. 1974, p. 116-120. 24 refs. In Russian.

**A74-23992**      **Light-regulated guanosine 3', 5'-monophosphate phosphodiesterase of bovine retina.** C. Gordinis and N. Virmaux (CNRS, Centre de Neurochimie, Strasbourg, France). *Nature*, vol. 248, Mar. 1, 1974, p. 57, 58. 11 refs. Research supported by the Clinique Sainte Anne and CNRS.

**A74-23993**      **Histochemical study of an inhibitor of fibrinolysis in the human arterial wall.** V. Noordhoek Hegt and P. Brakman (Centrale Organisatie TNO, Leiden, Netherlands). *Nature*, vol. 248, Mar. 1, 1974, p. 75, 76. 7 refs.

**A74-24088**      **Electrocardiographic and cineangiographic correlations in assessment of the location, nature and extent of abnormal left ventricular segmental contraction in coronary artery disease.** R. R. Miller, E. A. Amsterdam, H. G. Bogren, R. A. Massumi, R. Zelis, and D. T. Mason (California, University, Davis; Sacramento Medical Center, Sacramento, Calif.). *Circulation*, vol. 49, Mar. 1974, p. 447-454. 30 refs. Research supported by the Sacramento-Yolo-Sierra and San Bernardino California Heart Association; Grant No. NIH-HL-14780.

**A74-24089 \***      **The metabolic and hemodynamic effects of prolonged bed rest in normal subjects.** A. V. Chobanian, R. D. Lille, A. Tercyak (Boston University, Boston, Mass.), and P. Blevins. *Circulation*, vol. 49, Mar. 1974, p. 551-559. 32 refs. NASA-supported research; Grants No. PHS-HL-07299; No. PHS-RR-533.

Investigation in six normal subjects of the effects of chronic bed rest on the interrelationships between cardiovascular hemodynamics, catecholamine metabolism, vascular reactivity, renin and aldosterone activity, and electrolyte and fluid balance. Negative sodium and potassium balances and reductions in plasma volume were observed in all subjects, but plasma renin activity and aldosterone secretory rate showed no significant change. Other findings included the observation that major decreases in sodium balance and plasma volume occurred in the early bed rest period and did not correlate closely with the degree of orthostatic intolerance. M.V.E.

**A74-24194**      **The relationship between arousal level and habituation of the orienting reaction.** G. Bohlin (Uppsala, Universitet, Uppsala, Sweden). *Physiological Psychology*, vol. 1, Dec. 1973, p. 308-312. 29 refs. Research supported by the Swedish Council for Social Science Research.

Three groups of 10 Ss each were subjected to a habituation procedure with an auditory stimulus. Recordings were made of EEG and skin conductance. One group was tested in the morning after one night of sleep deprivation (SD) and the two others in the morning and afternoon following an ordinary night of sleep. The SD group showed a faster occurrence of sleep than did the other two groups, whereas the groups did not differ in rate of habituation of skin conductance responses to stimuli. Still, correlations between measures of arousal and habituation over all Ss were significant. (Author)

**A74-24195** The relationship between discrete and ongoing cerebral events. A. Salamy, P. E. Butler, J. L. McFarland, and W. A. Hargreaves (California, University, San Francisco, Calif.). *Physiological Psychology*, vol. 1, Dec. 1973, p. 327-329. 12 refs.

An attempt was made to determine the relationship between the somatosensory evoked response (SER) and preceding EEG activity. A canonical correlational analysis of a number of parameters derived from both prestimulus and poststimulus cerebral events revealed a complex pattern of relatedness between the two sets of electroencephalographic variables. However, the contribution made by each parameter to the canonical correlation showed little consistency across Ss. Moreover, the amount of variance in one set of parameters accounted for by the other set was relatively small. It was concluded that the SER, as recorded from the vertex, is essentially independent of ongoing EEG rhythms. (Author)

**A74-24196** Assumptions, conceptualizations, and the search for the functions of the brain. W. G. Webster (Carleton University, Ottawa, Canada). *Physiological Psychology*, vol. 1, Dec. 1973, p. 346-350. 18 refs. National Research Council of Canada Grant No. APA-0399.

The conditions under which methods of direct neurological manipulation may be of utility in the study of brain-behavior relations and of cerebral localization of function are discussed, with attention being directed in particular to the conflict of positions represented by R. L. Gregory and L. Weiskrantz. The argument is made that such methods are potentially useful only if the nervous system or particular portions of the nervous system can be conceptualized in terms of being a parallel, rather than a serial information processing system. It is further argued that inferences made on the basis of results generated with such methods (and indeed any method) are dependent upon the assumptions and conceptualizations concerning brain function held by the E. (Author)

**A74-24202 \*** The Apollo program and amino acids. S. W. Fox (Miami, University, Coral Gables, Fla.). *Science and Public Affairs*, Dec. 1973, p. 46-51. Grant No. NGR-10-009-008.

Apollo lunar sample analyses designed to detect the presence of organic compounds are reviewed, and the results are discussed from the viewpoint of relevance to laboratory experiments on the synthesis of amino acids and to theoretical models of cosmochemical processes resulting in the formation of organic compounds. Glycine, alanine, glutamic acid, aspartic acid, serine, and threonine have been found repeatedly in the hydrolyzates of hot aqueous extracts of lunar dust. These compounds represent an early step in the sequence of events leading to the rise of living material and were probably deposited by the solar wind. The results of the Apollo program so far suggest that the pathway from cosmic organic matter to life as it evolved on earth could have been pursued on the moon to the stage of amino acid precursors and then may have been terminated for lack of sufficient water. T.M.

**A74-24205** Problems of indirect determination of maximum oxygen uptake (Methodische Untersuchung zur indirekten Bestimmung der maximalen O<sub>2</sub>-Aufnahme). H. Lindemann, J. Rutenfranz, R. Mocellin, and W. Sbresny (Giessen, Universität, Giessen; Dortmund, Universität, Dortmund, West Germany). *European Journal of Applied Physiology*, vol. 32, no. 1, 1973, p. 25-53. In German.

**A74-24206** Studies concerning the mechanism of broncho-dilatation during exercise. I, II (Untersuchungen über den Mechanismus der Bronchialerweiterung bei körperlicher Arbeit. I, II). G. Hildebrandt and R. Knoerchen (Marburg, Universität, Marburg an der Lahn, West Germany). *European Journal of Applied Physiology*, vol. 32, no. 2, 1974, p. 117-129, 131-141. 63 refs. In German.

The vital capacity of ten healthy persons was reduced by about 20 and 40% with the aid of thoracic bandages. The maximal expiratory flow rate (MEFR) of the subjects was measured with a pneumometer at 2 min intervals. The measurements were conducted

while the subjects were engaged in sedentary treadle work which was increased stepwise to levels of 30, 60, 90, and 120 watts. The MEFR was also studied under various other conditions including a circulatory blockage. On the basis of the investigation it is concluded that afferent impulses which originate from the working muscles determine largely the broncho-motoric reactions to work. G.R.

**A74-24207** Distribution of plasma amino acids in humans during submaximal prolonged exercise. J. R. Poortmans, G. Siest, M. M. Galteau, and O. Houot (Bruxelles, Université Libre, Brussels, Belgium; Centre de Médecine Préventive, Vandoeuvre-lez-Nancy, Meurthe-et-Moselle, France). *European Journal of Applied Physiology*, vol. 32, no. 2, 1974, p. 143-147. 23 refs.

Twelve healthy subjects were submitted to an 1 h exercise at two-third of their maximal oxygen consumption. Venous blood samples were drawn before, during and after the exercise. The lactate and amino acid pattern were investigated. The results showed that alanine, methionine and citrulline were significantly changed during the work. The largest difference was that of alanine which accounted for 50 per cent of the total amino acid variation. The data are analyzed in view on the pyruvate metabolism. (Author)

**A74-24208** A test of cardiac function during strenuous exercise. V. Thomas (Liverpool Polytechnic, Liverpool, England). *British Journal of Sports Medicine*, vol. 7, Nov. 1973, p. 139-141.

Discussion of the validity of the cardiac assessment factor (CAF) as a test of general application for evaluating the reaction of the heart to exercise at maximal levels. Correlations between CAF and other measures of fitness are reviewed. M.V.E.

**A74-24209** Radio telemetric studies of pulse rate and spiro-ergometric studies in the assessment of endurance performance capacity and training loads. D. Clasing and R. Bucher (Münster, Universität, Münster, West Germany). *British Journal of Sports Medicine*, vol. 7, Nov. 1973, p. 152-155. 9 refs. In German.

**A74-24210** Electrocardiographic changes in persons with acute high altitude hypoxia - Studies in a low pressure chamber. S. Lukasiak and W. Kornaszewski (Wrocław, Akademia Medyczna, Wrocław, Poland). *British Journal of Sports Medicine*, vol. 7, Nov. 1973, p. 177-179.

Study of electrocardiographic changes in 223 healthy glider pilots and parachutists, aged 17-29, subjected in a pressure chamber to a low pressure corresponding to an altitude of 6500 m. The study was aimed at determining the ECG features and changes useful for predicting good or poor adaptation to hypoxia. Hypervagotonia, flat T waves, left axis deviation, and anomalies in the intraventricular conduction system were found to indicate poor adaptation to hypoxia. Moderate sinus rhythm acceleration and T-wave flattening show good adaptation. M.V.E.

**A74-24211** Analysis of the parameters of electrocardiograms surveyed in 104 racing drivers of the regions Marche-Abruzzi /Central Italy/. V. Federici (Ascoli Piceno, Centre of Sports Medicine, Italy). *British Journal of Sports Medicine*, vol. 7, Nov. 1973, p. 211-213.

**A74-24212** The biphasic nature of pilot error in gliding accidents. B. James. *British Journal of Sports Medicine*, vol. 7, Nov. 1973, p. 283, 284. 6 refs.

The two states of unduly low or high arousal are shown to underlie the biphasic nature of pilot error in gliding accidents. Preventive measures to be considered are the education of sportsmen to the fact that their skills may fail them at levels of high or low arousal and that measures of emotional self-control are required: the sportsman must control his level of arousal to maintain his position on the crest of his performance curve. M.V.E.

**A74-24213** Physical fitness and flying. A. Koch. *British Journal of Sports Medicine*, vol. 7, Nov. 1973, p. 285-288. In German.

Discussion of the concept of physical fitness as it relates to flying personnel, in particular. Procedures for the evaluation of physical fitness are reviewed, along with the specific stresses the human organism is exposed to by flying and the major factors that tend to impair or improve physical fitness. M.V.E.

**A74-24318 \*** Correlations between brain tryptophan and plasma neutral amino acid levels following food consumption in rats. J. D. Fernstrom, F. Larin, and R. J. Wurtman (MIT, Cambridge, Mass.). *Life Sciences*, vol. 13, 1973, p. 517-524. 10 refs. NASA-supported research; Grant No. PHS-AM-14228.

**A74-24345 #** Blood flow and oxygen consumption of the rat brain in profound hypoxia. H. Johansson and B. K. Siesjö (University Hospital, Lund, Sweden). *Acta Physiologica Scandinavica*, vol. 90, Jan. 1974, p. 281, 282. 5 refs. Research supported by the Swedish Bank Tercentenary Fund; Grant No. NIH-5-R01-NS-07838-05. SMRC Project 14X-263; SMRC Project 14X-2179.

A preliminary account is given of experiments designed to measure cerebral blood flow (CBF) and cerebral metabolic rate for oxygen (CMR sub O<sub>2</sub>) in profound hypoxia. The results demonstrate that the maintenance of normal tissue concentration of adenosine triphosphate, adenosine diphosphate, and adenosine monophosphate in profound hypoxia is not due to a decrease in the rate of cerebral oxygen consumption. Thus, provided the 'closed box' method used by Duffy et al. (1972) gives a valid measure of metabolic rate in hypoxia, it must be concluded that accidental hypothermia occurring in their animals was responsible for the calculated decrease in metabolic rate. It follows from the present experiments that the increase in CBF is responsible for the homeostatic regulation of the energy state of the brain in hypoxia. F.R.L.

**A74-24362** A new rotating gradient disk - Brightness, flicker, and brightness aftereffects. J. T. Walker (Missouri, University, St. Louis, Mo.). *Vision Research*, vol. 14, Mar. 1974, p. 223-228. 12 refs.

A disk is divided into 18 equal sectors, each a different shade of gray. The sectors range from black through white in a stepwise circumferential brightness gradient comparable to a circular optical wedge. The disk appears brighter rotating in one direction and darker rotating in the other, thus producing two brightness-frequency functions, one for each direction of rotation. Below the critical flicker frequency, apparent brightness depends jointly on the frequency and direction of rotation, but Talbot-level brightness and critical flicker frequency are independent of rotation direction. Rotation in one direction produces an aftereffect of apparent brightening in a subsequently viewed steady light, and rotation in the other direction produces a dimming aftereffect. (Author)

**A74-24363** Light adaptation and the dynamics of induced tilt. E. A. Martin (Columbia University, New York, N.Y.). *Vision Research*, vol. 14, Mar. 1974, p. 255-265. 67 refs. NSF Grant No. GB-5947; Grant No. NIH-EY-00375.

Experimental study of changes in the perceived slant of a test line when it is presented in conjunction with a straight inducing line. A psychophysical study was made of the perceived orientation of a briefly presented (10 msec) slanted test line as a function of its temporal relation to a single vertical inducing line. The test line was flashed at various times before, during, and after the time during which the inducing line was present. This temporal paradigm is similar to the one introduced by Crawford (1947) for studying changes in sensitivity during early light and dark adaptation. In the present context, it has the advantage of permitting a study of the illusion and the early time course of the spatial aftereffect within the same experiment. It also provides data on the perceptual effect of an inducing line presented subsequent to the extinction of a test line. A.B.K.

**A74-24364** Reduction of acuity in a brightness contrast situation. T. Oyama and H. Aoki (Chiba University, Yayoicho, Japan). *Vision Research*, vol. 14, Mar. 1974, p. 267-269. 11 refs.

Description of an experiment carried out to study the effects of inducing and test luminances upon the perceived brightness and acuity measured in a typical brightness contrast situation. In this experiment different stimulus patterns were presented to the observer's two eyes through two different optical channels - namely, a circular test field and a surrounding ring-shaped inducing field to the right eye, and a circular comparison field to the left eye. It is found that acuity shows stronger resistance to inducing (glare) light than does perceived brightness. Acuity decreases only when the inducing luminance is much higher than the test luminance. It is concluded that the perceived brightness of both the bright and dark areas decreased with an increase in inducing luminance and that the corresponding retinal or cortical excitations also decreased. A.B.K.

**A74-24496** Membrane model for the circadian clock. D. Nijss, F. M. Sulzman, and J. W. Hastings (Harvard University, Cambridge, Mass.). *Nature*, vol. 248, Mar. 8, 1974, p. 116-120. 71 refs. NIH-supported research.

A membrane model for the biological clock is described which accounts qualitatively for many characteristic features. Ion concentrations and ion transport channels function as a feedback system to generate self-sustained circadian oscillations. Light acts on the rhythm either directly or through hormonal coupling to deplete trans-membrane ion gradients. Temperature compensation of the free-running period is a consequence of the temperature adaptation of membrane lipids. It is speculated that the timekeeping involves time-dependent cooperativity and the rearrangement of membrane-intercalated particles. It is suggested that ferritin labeling and freeze-fracture electron microscopy may be useful in observing circadian rhythms in the arrangement of membrane-intercalated particles. M.V.E.

**A74-24506** The role of spinal thermosensitive structures in the respiratory heat loss during exercise. D. P. Clough (Max-Planck-Institut für Physiologische und Klinische Forschung, Bad Nauheim, West Germany) and C. Jessen (Giessen, Universität, Giessen, West Germany). *Pflügers Archiv*, vol. 347, no. 3, 1974, p. 235-248. 23 refs.

**A74-24507** An improved apparatus for blood flow measurement utilising the principle of 'internal calorimetry'. E. E. Ohnhaus and E. Hunziker (Sandoz, Ltd., Basel, Switzerland). *Pflügers Archiv*, vol. 347, no. 3, 1974, p. 255-260. 6 refs.

**A74-24515** Erythrocyte evolution - The significance of the Fahraeus-Lindqvist phenomenon. G. K. Snyder (California, University, Riverside, Calif.). *Respiration Physiology*, vol. 19, Dec. 1973, p. 271-278. 19 refs. Grant No. NIH-5-T01-HL-05784-05.

The relationship between tube radius and blood viscosity is determined for dog erythrocyte suspensions. This relationship is used to compare the pressure that would be required to maintain blood flow in a dog's circulatory system when it is perfused with an erythrocyte suspension at the pressure required by the same system perfused with a hemoglobin solution of comparable oxygen-carrying capacity. The results obtained are discussed in relation to the Fahraeus-Lindqvist phenomenon and are shown to support the argument that, in an intact circulatory system, packaging hemoglobin in blood corpuscles would lessen the workload required to maintain a given cardiac output. M.V.E.

**A74-24516** Intracellular mechanisms of oxygen transport in flowing blood. R. Zander (Mainz, Universität, Mainz, West Germany) and H. Schmid-Schönbein (München, Universität, München, West Germany). *Respiration Physiology*, vol. 19, Dec. 1973, p. 279-289. 28 refs.

Investigation of the relative role of four possible mechanisms of intracellular oxygen transport in flowing blood, namely, the dif-

fusion and convection of both dissolved and chemically bound oxygen. The results obtained include the finding that intracellular convective oxygen transport is of greater significance than the diffusive one. M.V.E.

**A74-24517** A formulation for the partition of free vs hemoglobin-bound 2,3-diphosphoglycerate. D. M. Gomez (New York University, New York, N.Y.) and P. R. B. Caldwell (Columbia University, New York, N.Y.). *Respiration Physiology*, vol. 19, Dec. 1973, p. 290-297. 8 refs. U.S. Department of Health, Education and Welfare Grant No. 16-P-56801-2-11; Grants No. PHS-HL-02001; No. PHS-HL-05443; No. PHS-HL-05741.

**A74-24518** pH, P/CO<sub>2</sub>, and P/O<sub>2</sub> of cisternal cerebrospinal fluid in high altitude natives. M. C. Blayo, J. P. Marc-Vergnes, and J. J. Pocidallo (Hôpital Claude Bernard, Paris, France; Instituto Boliviano de Biología de la Altura, La Paz, Bolivia). *Respiration Physiology*, vol. 19, Dec. 1973, p. 298-311. 47 refs.

**A74-24519** Arterial acid-base changes in unanaesthetized rats in acute hypoxia. L. D. Lewis, U. Ponten, and B. K. Siesjö (University Hospital, Lund, Sweden). *Respiration Physiology*, vol. 19, Dec. 1973, p. 312-321. 29 refs.

**A74-24520** Effect of body temperature and hypoxia on the ventilatory CO<sub>2</sub> response in man. H. Vejby-Christensen and E. Strange Petersen (Aarhus Universitet, Aarhus, Denmark). *Respiration Physiology*, vol. 19, Dec. 1973, p. 322-332. 29 refs. Research supported by the Danish Medical Research Council.

The ventilatory CO<sub>2</sub>-response and the effect of hypoxia on this relationship were studied in four healthy subjects at normal and at elevated (+1.5 C) body temperature. The experiments were carried out in a climatic chamber. Expired minute ventilation, rectal temperature, and arterial tensions of oxygen and carbon dioxide were measured. The results seem to be evidence of a specific action of hyperthermia in the respiratory regulation apart from the drives related to discomfort of the experimental situation. Whether the effect of hyperthermia in our hyperoxic experiments is a direct temperature effect on central respiratory neurones or an indirect one is unknown. The potentiation of the hypoxic stimulus during hyperthermia, however, might be mediated through the arterial chemoreceptors. (Author)

**A74-24521** A possible explanation for exercise pulmonary CO diffusion capacity based on estimations of lung surface area and membrane thickness. H. L. Barlett, J. Kollias, J. L. Hodgson, and E. R. Buskirk (Pennsylvania State University, University Park, Pa.). *Respiration Physiology*, vol. 19, Dec. 1973, p. 333-343. 20 refs. Grant No. PHS-CPE-R-70-0043.

A method is presented for predicting exercise pulmonary CO diffusion capacity in healthy young males from measures of resting pulmonary CO diffusion capacity and lung volumes. Attempts to explain the increase in pulmonary CO diffusion capacity with exercise, on the basis of lung volumes, have met with limited success. However, when measured lung volumes are used to estimate lung surface area and membrane thickness, and pulmonary CO diffusion capacity is referenced to or predicted from these estimates, the relationship appears to be an explanation for the increase in pulmonary CO diffusion capacity during exercise. (Author)

**A74-24522** Continuous recording of pleural surface pressure at various sites. E. D'Angelo and E. Agostoni (Milano, Università, Milan, Italy). *Respiration Physiology*, vol. 19, Dec. 1973, p. 356-368. 12 refs. Research supported by the Consiglio Nazionale delle Ricerche.

A method has been developed that enables continuous recording of pleural surface pressure in dogs without producing a pneumothorax. The end-expiratory values agree with those obtained with the counterpressure technique. The tidal changes are not systematically different at various sites. As with the counterpressure technique, we found that the vertical gradient of transpulmonary pressure dis-

appears when the respiratory system is passively expanded and that a cranio-caudal gradient of transpulmonary pressure is produced in the supine posture when the abdominal pressure is lowered. The kinetics of pleural pressure during spontaneous breathing in some cases differed among sites and among dogs. During inspiratory efforts the kinetics tended to become similar (Author)

**A74-24523** Surface tension properties of lung alveolar surfactant obtained by alveolar micropuncture. R. Reifenrath and I. Zimmermann (Max-Planck-Institut für experimentelle Medizin, Göttingen, West Germany). *Respiration Physiology*, vol. 19, Dec. 1973, p. 369-393. 19 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A bubble method was used to record dynamic area/surface-tension diagrams (ASD's) both for lung alveolar surfactant (LAS) obtained by micropuncture of rat lung alveoli, and for pulmonary surfactant (PS) obtained by rinsing the bronchi. These ASD's are fundamentally like those characteristic of films of mixed lecithin and cholesterol. After lipid fractionation of the LAS material, typical lecithin and cholesterol films are obtained. At the end of the compression phase, the minimal surface tension of the LAS films and the PS films is 18-20 dyn/cm; this value is independent both of the amplitude of the area oscillation and of the absolute value of the area. The difference between maximal and minimal surface tension is dependent on the amplitude of oscillation of area or of radius, up to maximal surface tensions equal to the surface tension of the hypophase. (Author)

**A74-24571** # Development of the inner ear in albino rat embryos subjected to discontinuous hypoxia - Histochemical studies (Sviluppo dell'orecchio interno in embrioni di ratti albini sottoposti ad ipossia discontinua Ricerche istochimiche). C. Vacca, G. V. Pelagalli (Napoli, Università, Naples, Italy), C. Koch, G. P. Pizzuti, and P. Castagliuolo. *Rivista di Medicina Aeronautica e Spaziale*, vol. 36, Jan.-June 1973, p. 5-9, 11-14. In Italian.

**A74-24572** # Psychodiagnostic studies of a group of military pilots (Indagini psicodiagnostiche su un gruppo di piloti militari). M. Rizzo and P. A. Rizzo. *Rivista di Medicina Aeronautica e Spaziale*, vol. 36, Jan.-June 1973, p. 31-51. 7 refs. In Italian.

Comparative study of the results of Rorschach testing of a group of military pilots, a group of nonpilot members of the air force, and a group of civilians of the same sex, age, and cultural level as the pilots. On the basis of tests of the level of comprehension and the interior life of the various groups, as analyzed by a method of terciles, it is concluded that the pilots are somewhat more intelligent, spiritually more mature, and richer in interior life and affective sociability than the normal mean value. The very few anomalies noted and the modest deficiencies observable in their examination records do not have any appreciable effect on the characteristics of their excellent psychological profile. A.B.K.

**A74-24573** # In-flight attention stability and piloting learning (Stabilità attentiva in volo ed apprendimento del pilotaggio). A. Tricarico. *Rivista di Medicina Aeronautica e Spaziale*, vol. 36, Jan.-June 1973, p. 52-66. 17 refs. In Italian.

Results of a study in which a large group of student pilots were given the Toulouse-Piéron attention test in flight and subsequently on the ground. The presence of a very significant correlation between in-flight attention stability and piloting learning is noted, as well as the existence of a highly significant difference between the average qualitative values of the Toulouse-Piéron test in flight and on the ground. It is hypothesized that this difference may be due to the involvement of an additional variable under flight conditions namely, anxiety, which is responsible for the inhibition of in-flight attentiveness. A.B.K.

**A74-24574** # Efficiency of the man-machine relation under unfavorable environmental conditions in the military context (Efficienza del rapporto uomo-macchina in condizioni ambientali sfa-

vorevoli nell'ambito militare). P. Rota. *Rivista di Medicina Aeronautica e Spaziale*, vol. 36, Jan.-June 1973, p. 67-82. 11 refs. In Italian.

**A74-24575 # Sports in the evolutionary stage and athletic training of young people with particular reference to the attitude of young people to aircraft piloting and to the contribution of sports as a means of psychophysical strengthening of the pilot (Lo sport nell'età evolutiva e la formazione sportiva dei giovani, con particolare riferimento all'attitudine dei giovani al pilotaggio aereo ed al contributo dello sport quale mezzo di potenziamento fisiopsichico dell'aviatore).** G. Rotondo. *Rivista di Medicina Aeronautica e Spaziale*, vol. 36, Jan.-June 1973, p. 107-121. 20 refs. In Italian.

**A74-24659 \* Rotary acceleration of a subject inhibits choice reaction time to motion in peripheral vision.** J. M. Borkenhagen (California State University, San Jose, Calif.). *Journal of Experimental Psychology*, vol. 102, Mar. 1974, p. 484-487. 10 refs. Grant No. NGL-05-046-002.

Twelve pilots were tested in a rotation device with visual simulation, alone and in combination with rotary stimulation, in experiments with variable levels of acceleration and variable viewing angles, in a study of the effect of S's rotary acceleration on the choice reaction time for an accelerating target in peripheral vision. The pilots responded to the direction of the visual motion by moving a hand controller to the right or left. Visual-plus-rotary stimulation required a longer choice reaction time, which was inversely related to the level of acceleration and directly proportional to the viewing angle. V.Z.

**A74-24672 # Hypoxia during high-altitude flight (Sauerstoffmangel bei Höhenflügen).** Mr. Krefft. *Aero-Revue*, Mar. 1974, p. 149-151. In German.

The adverse effects of high-altitude hypoxia upon an unprotected pilot's organism and flight performance are discussed as a function of exposure duration and altitude. The urgency is pointed out for every flight sportsman to be thoroughly acquainted with the hazards of high-altitude hypoxia. M.V.E.

**A74-24676 \* Parabarosis and experimental infections. I - Effect of varying O<sub>2</sub> tensions on influenza virus infection in mice.** F. B. Gordon and J. D. Gillmore (U.S. Naval Medical Research Institute, Bethesda, Md.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 241-248. 26 refs. NASA Contract No. A03061A(A5-1). Navy Task M4306,01-1200BCK9.

**A74-24677 \* Parabarosis and experimental infections. II - Body temperatures of small animals; methods of observation and control.** J. D. Gillmore and M. Eicher (U.S. Naval Medical Research Institute, Bethesda, Md.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 249-253. 11 refs. NASA Contract No. A03061A(A5-1). Navy Task M4306,01-1200BCK9.

**A74-24678 \* Parabarosis and experimental infections. III - Susceptibility of mice to influenza virus as modified by chilling and by hyperbaric helium atmosphere. IV - Effect of varying O<sub>2</sub> tensions on chlamydial infection in mice and cell cultures.** F. B. Gordon and J. D. Gillmore (U.S. Naval Medical Research Institute, Bethesda, Md.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 254-262. 20 refs. NASA Contract No. A03061A(A5-1). Navy Task M4306,01-1200BCK9.

**A74-24679 \* Thermal preparation of foods in space-vehicle environments.** R. B. Bannerot, J. E. Cox, C. K. Chen, and N. D. Heidelbaugh (Houston, University; NASA, Johnson Space Center, Food and Nutrition Branch, Houston, Tex.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 263-268. 12 refs. Contract No. NAS9-11676.

Convection is the primary heat transfer mechanism for most foods heated in an earth-based environment. In contrast, in the low-gravity environment of space flight, the primary heat transfer

mechanism is conduction (or radiation in the absence of a conducting medium). Conduction heating is significantly slower and less efficient than convection heating. This fact poses a problem for food heating during space flight. A numerical model has been developed to evaluate this problem. This model simulates the food-heating process for Skylab. The model includes the effect of a thermally controlled on/off heat flux. Parametric studies using this model establish how the required heating time is affected by: the thermal diffusivity of the nutrient materials, the power level of the heater, the initial food temperatures, and the food container dimensions. (Author)

**A74-24680 Transient-state diffusion in rat subcutaneous tissue.** M. P. Hlastala (Washington, University, Seattle, Wash.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 269-273. 23 refs.

Transient-state diffusion of an inert gas was measured in the subcutaneous tissue of rats. An existing subcutaneous gas pocket was surgically opened exposing the inner surface with the perfusion intact, and a rigid, transparent chamber was mounted on the exposed surface. The uptake of diethyl ether by tissue was measured as a change in chamber pressure using an attached pressure transducer. The uptake rate could be accurately predicted using a mathematical model in which the tissue is perfused by an infinite number of infinitesimally small capillaries. The transient state was relatively independent of tissue perfusion and allowed measurement of the diffusivity of diethyl ether which was 0.000757 plus or minus 0.000052 sq cm/min (mean plus or minus SEM) at a mean temperature of 38.4 C. This phase was over in 2 to 20 min, depending on the perfusion. The steady state was strongly dependent on tissue perfusion and allowed measurement of perfusion which varied between experiments. (Author)

**A74-24681 \* Unified method for serial study of body fluid compartments.** C. P. Spears, K. H. Hyatt, J. M. Vogel, and S. B. Langfitt (U.S. Public Health Service Hospital, San Francisco, Calif.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 274-278. 37 refs. NASA Order T-68099-G.

Methods for the simultaneous determination of equilibrium space of I-125/RISA (radio-iodinated serum albumin) (plasma volume), Cr-51 red cell mass, Br-82 space (extracellular fluid volume), and tritiated water space (total body water) are described. Determinations were made on two occasions separated by a 1 week interval in 43 healthy young men who were on a strict metabolic diet. Hourly samples were taken for 6 hours after injection of the radionuclides. Correlation of these values to the inscribed exponential disappearance curve was high. In 15 subjects, earlier and more-frequent sampling led to no improvement in the accuracy of estimation of the I-125/RISA space. Use of this method gave results in 12 subjects for Br-82 space and in 11 subjects for tritiated water space which were not significantly different from those obtained by correction for urine loss. (Author)

**A74-24682 Studies on dysbarism. V - Prevention of decompression sickness in mice by dimethothiazine.** C. Chrysanthou, F. Teichner, and M. Koutsoyiannis (Beth Israel Medical Center; New York, City University, New York, N.Y.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 279-282. 9 refs. Research supported by the Lenore Weinstein Fund; Contract No. N00014-68-0393. NR Project 101-735.

Dimethothiazine, a compound with activities against smooth muscle stimulating agents, exhibits protective effects against decompression sickness in obese mice which are susceptible to the disease. In groups receiving dimethothiazine prior to compression, mortality is significantly reduced and clinical manifestations and pathologic changes are less frequent and less pronounced than in corresponding control groups subjected to identical pressure conditions. The results of this report are in accord with the previously proposed pathogenetic concept which implicates humoral smooth muscle stimulating factors in the mechanism of decompression sickness. (Author)

**A74-24683 \* Life span and fine structural changes in oxygen-poisoned drosophila melanogaster.** D. E. Philpott, K. G. Bensch, and J. Miquel (NASA, Ames Research Center, Moffett Field;

Stanford University, Stanford, Calif.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 283-289. 34 refs.

**A74-24684 # Influence of ethyl alcohol ingestion on a target task during sustained +Gz centrifugation.** R. R. Burton and J. L. Jaggers (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 290-296. 27 refs.

Eight adults (7 males and 1 female) drank orange juice mixed with 95% ethyl alcohol. Alcohol content of the juice was not revealed to the subject. One hour afterwards, per cent blood alcohol (B/A) was determined by breath analysis, and then the subject was exposed to a series of 7-sec tasks during 45-sec accelerations (+Gz). During each acceleration, a subject was randomly presented six tracking tasks. Performance was quantified as the time in seconds required to 'hit' an electronic target. The combination of the higher alcohol and G levels resulted in a potentiated reduction in performance. A 9.9% reduction per G in performance per 0.10 B/A was evident in the range from 1 through 6 G, independent of the decrease in performance at various accelerative levels with a B/A of zero.

(Author)

**A74-24685 \* # Decompression sickness in simulated Apollo-Soyuz space missions.** J. P. Cooke and W. G. Robertson (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 297-300. 13 refs. NASA Order T-82170.

Apollo-Soyuz docking module atmospheres were evaluated for incidence of decompression sickness in men simulating passage from the Russian spacecraft atmosphere, to the U.S. spacecraft atmosphere, and then to the American space suit pressure. Following 8 hr of 'shirtsleeve' exposure to 31:69:02:N2 gas breathing mixture, at 10 psia, subjects were 'denitrogenated' for either 30 or 60 min with 100% O2 prior to decompression directly to 3.7 psia suit equivalent while performing exercise at fixed intervals. Five of 21 subjects experienced symptoms of decompression sickness after 60 min of denitrogenation compared to 6 among 20 subjects after 30 min of denitrogenation. A condition of Grade I bends was reported after 60 min of denitrogenation, and 3 of these 5 subjects noted the disappearance of all symptoms of bends at 3.7 psia. After 30 min of denitrogenation, 2 out of 6 subjects developed Grade II bends at 3.7 psia.

(Author)

**A74-24686 Maximal treadmill testing of normal USAF aircrewmembers.** V. F. Froelicher, Jr., M. Allen, and M. C. Lancaster (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 310-315. 18 refs.

The results of using the Balke maximal treadmill protocol in evaluating aircrewmembers without medical or cardiovascular disease were analyzed. Two groups of men were included: (1) 519 referral subjects who represent a sampling of the aircrew population; and (2) 191 special project candidates who were chosen administratively because of exceptional abilities and who were generally more physically active than the referral subjects. Means and standard deviations for maximal heart rate, maximal oxygen consumption, and treadmill time were determined for the two groups by age increments. Equations for maximal heart rate and maximal oxygen consumption regressed on age were constructed from this data and compared to the results of other investigators.

(Author)

**A74-24687 Case report of an in-flight incident involving an aircraft commander with a psychiatric illness.** V. Ordiway and R. B. Rayman (U.S. Air Force Hospital, Clark AFB, Philippines). *Aerospace Medicine*, vol. 45, Mar. 1974, p. 316, 317.

**A74-24688 Alcohol in aviation - A problem of attitudes.** J. A. Pursch (U.S. Naval Regional Medical Center, Long Beach, Calif.). (*Aerospace Medical Convention, 44th, Las Vegas, Nev., May 7-10, 1973.*) *Aerospace Medicine*, vol. 45, Mar. 1974, p. 318-321. 8 refs.

Alcoholism is defined as a disease and as the fourth most serious public health problem in the United States. The ambivalence which

hampers the recognition and treatment of alcoholism is explored in terms of our moralistic heritage, our current drinking customs and the attitudes of both laymen and physicians. Case histories of pilots are cited to illustrate how the superiors and families of alcoholic pilots help them deny their illness until they have to be hospitalized, at which point the doctors are apt to 'help' the patient along by giving him a benign-sounding diagnosis which is often not changed to alcoholism until three hospitalizations later. The need for physicians to update their knowledge about alcoholism and thus bring better care earlier to the alcoholic aviator is stressed.

(Author)

**A74-24829 # Biopotentials in the heart rhythm on an encephalogram (Biopotentsialy v ritme serdtsa na elektroentsefalogramme).** L. I. Starikov. *Voenno-Meditsinskii Zhurnal*, Jan. 1974, p. 46-51. In Russian.

A study of the nature of biopotentials which appear as conspicuous spikes on the encephalograms of flying personnel indicates that such spikes are caused by superposition of the electric field of the heart on the bioelectrical activity of the brain. It is also shown that the biopotentials of the heart recorded on an encephalogram are fine indicators of a hyperfunction of the left ventricle which may be linked to an increased peripheral resistance of the sanguiferous canal. It is pointed out that persistent high-amplitude biopotentials of the heart are not present in clinically healthy pilots and should draw attention of physicians to determine their causes when they are recorded.

V.Z.

**A74-24830 # Action of intense noise on ototopia (Deistvie shuma bol'shoi intensivnosti na ototopiku).** V. P. Rudenko and I. Sabadosh. *Voenno-Meditsinskii Zhurnal*, Jan. 1974, p. 58, 59. In Russian.

Auditory spatial orientation capability was investigated in 19 healthy subjects and four subjects with affected hearing who received spoken acoustic signals from a mobile source prior to and after a 10 min period of exposure to 90 dB noise produced by an operating aircraft engine. The effect of noise on auditory spatial orientation was insignificant in healthy subjects and was substantial in subjects with neuritis of the auditory nerve.

V.Z.

**A74-24831 # Psychophysiological features of flight-crew activities in military transport aviation during low-altitude flights (Psikhofiziologicheskie osobennosti deiatel'nosti letnogo sostava voenno-transportnoi aviatsii pri poletakh na mal'kikh vysotakh).** G. I. Gurvich, E. V. Bondarev, V. A. Egorov, V. L. Marishchuk, and V. V. Tolstov. *Voenno-Meditsinskii Zhurnal*, Jan. 1974, p. 60-63. In Russian.

**A74-24832 # Medical aspects of low-altitude flights in a turbulent atmosphere (Meditsinskie aspekty poletov na mal'kikh vysotakh v turbulentnoi atmosfere).** V. G. Kuznetsov and V. F. Zhernakov. *Voenno-Meditsinskii Zhurnal*, Jan. 1974, p. 63-67. In Russian.

EKGs, vision acuity, vestibular function, and performance quality were examined on a simulation test stand in 168 healthy men including 52 pilots in a study of the effects of alternating accelerations during low-altitude flights in a turbulent atmosphere on the organism and professional performance of flying personnel. Higher respiration rates, a lower close-range vision acuity, slower conditioned reflexes, seasickness symptoms, and a lower professional performance were frequently observed in the subjects during tests. Similar effects were observed also in some pilots during actual low altitude flights. Suggestions are made concerning stricter medical checks of pilots with low-altitude flying assignments.

V.Z.

**A74-24841 Application of random search techniques and stochastic approximation in human operator modelling.** G. Johannsen (Forschungsinstitut für Antropotechnik, Meckenheim, West Germany). In: Identification and system parameter estimation; Proceedings of the Third Symposium, Delft, Netherlands, June 12-15, 1973, Part 1. Amsterdam, North-Holland Publishing Co., 1973, p. 251-254. 10 refs.

Description of off-line parameter optimization techniques for nonlinear multiparameter controller models of the human operator in manual vehicular control problems. The model parameters (a total of eleven) are estimated for the same time slices of data by means of (1) a random search technique and (2) a stochastic approximation algorithm. The random search technique presented is one which combines directional and step size adaptation. It is contrasted with directional adaptive random search. The stochastic approximation algorithm is of the Kiefer-Wolfowitz type, expanded with step size adaptation and random search features. The techniques are compared with each other regarding their convergence speed, the detection of the global minimum, and the final values of the criterion function.

(Author)

**A74-24877 # First polyimide-fiberglass composite bump helmet for flight in NASA's Skylab and Space Shuttle missions.** E. F. Bushman and J. A. Van Haastert (Sierra Engineering Co., Sierra Madre, Calif.). In: The wide world of reinforced plastics; Proceedings of the Twenty-ninth Annual Conference, Washington, D.C., February 5-8, 1974. New York, Society of the Plastics Industry, Inc., 1974, p. 18-A,1 to 18-A,6.

The 2.5-pound protective helmet described is molded in polyimide-fiberglass composite. It employs the most fire-, heat-, and gas-resistant exotic composite and synthetic materials. The structural shell is prepared from fiberglass fabric bonded with fire-resistant polyimide resin. The adjustable chin strap and headband assemblies consist of polybenzimidazole fiber fabric, felt, and webbing. The shock absorbing head liner is Fluorel foam rubber, and the elastomeric edge beading is a Fluorel-Refset rubber extrusion. Stitching employs Nomex thread.

V.P.

**A74-24947 / A human operator model for tracking with preview.** L. D. Reid and N. H. Drewell (Toronto, University, Toronto, Canada). *CASI Transactions*, vol. 6, Sept. 1973, p. 86-91.

A set of describing functions was measured for subjects performing a rate-control pursuit task with preview in an attempt to study the time-delay and lead characteristics found in human operator models. The preview utilized ranged up to 0.8 sec., appearing as a tail to the right of the target symbol. It was found that the preview had dramatic effects on the form of the describing functions.

(Author)

**A74-24996 # Cold injuries (Porazheniia kholodom).** G. N. Klintsevich. Leningrad, Izdatel'stvo Meditsina, 1973. 216 p. 503 refs. In Russian.

The monograph reviews clinical data and published studies on injuries and other health disorders caused by exposure to cold air and water, covering numerous individual cases of harmful effects of cold under natural conditions, in accidents, and during massive exposures such as in wars, shipwrecks and natural disasters. The clinical, physiological, surgical, prophylactic, and therapeutic aspects of cold-induced injuries are discussed. Particular attention is given to advanced tissue transplant techniques.

V.Z.

**A74-25014 # Amine acid contents and transformations in cerebral artery wall tissues (Soderzhanie i nekotorye prevrashcheniia aminokislot v tkaniakh stenok arterii mozga).** S. A. Mirzoiian, B. A. Kazarian, and V. P. Akopian (Erevanskii Gosudarstvennyi Meditsinskii Institut; Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Akademiia Nauk SSSR, Doklady*, vol. 214, Jan. 11, 1974, p. 465-467. 7 refs. In Russian.

Amino acid contents were determined by chromatography in cerebral blood vessel samples from 33 traffic accident victims and also from dogs and puppies in a study of amino acid transformations with age. Among amino acids in human samples, glutamic and aspartic acids had the highest contents, declining with age. The trend was similar in samples from adult dogs and puppies.

V.Z.

**A74-25015 # Determination of individual quantitative parameters of typological features of human higher nervous system activity from indices of the aftereffect of a multidimensional**

**stimulus (Viznachennia kil'kiskikh individual'nikh parametrov tipologichnikh osoblivostei vishchoi nervovoi diial'nosti liudini za pokaznikami pisladii bagatomirnogo podraznika).** L. V. Volkov and T. Iu. Moiseeva (Kiivs'kii Institut Fizichnoi Kul'tury, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 20, Jan.-Feb. 1974, p. 16-20. 6 refs. In Ukrainian.

**A74-25016 # Significance of sympathetic innervation for cardiovascular system functions in the early period of ontogenesis during hypoxic hypoxia (Pro znachennia simpaticnoi innervatsii dlia funktsii sertsevo-sudinnoi sistemi rannii period ontogenezu pri gipoksichnii gipoksii).** M. M. Koganov'ska and O. I. Gorobets' (Akademiia Nauk Ukrain'skoi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 20, Jan.-Feb. 1974, p. 33-38. 15 refs. In Ukrainian.

**A74-25017 # Influence of triiodothyronine on the development of cold adaptation and the calorogenic action of catecholamines (Vpliv triiodotironinu na rozvitok adaptatsii do kholodu ta kalorigennu diu katekholaminiv).** S. O. Pevnii and V. I. Sobolev (Donets'kii Derzhavnyi Universitet, Donetsk, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 20, Jan.-Feb. 1974, p. 83-86. 14 refs. In Ukrainian.

**A74-25018 # Comparative temperature effect estimation during adaptation to cold (Porivnial'na otsinka temperaturnikh rezhimiv adaptatsii do kholodu).** L. A. Liakh (Donets'kii Derzhavnyi Universitet, Donetsk, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 20, Jan.-Feb. 1974, p. 87-94. 32 refs. In Ukrainian.

Measurements of body temperature, blood glucose content and adrenal function in rats subjected to multiple-intermittent exposures to temperatures of 5, 2 and 0 C suggested that adaptation to cold was better with exposures to 5 C. The body temperature went close to the normal body temperature, the adrenal function was less excited, and the blood glucose content stabilized on a new level after 26 to 30 exposures, while adaptation to cold failed to develop after 45 exposures to 2 C, and all animals perished after exposures to 0 C.

V.Z.

**A74-25019 # Structural analysis of a mathematical model for gas metabolism in lungs (Strukturnii analiz matematichnoi modeli protsesu gazoobminu v legeniakh).** A. G. Misiura (Akademiia Nauk Ukrain'skoi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 20, Jan.-Feb. 1974, p. 108-113. 5 refs. In Ukrainian.

A mathematical model of pulmonary gas metabolism is constructed and is analyzed in a study of interrelations between the physical processes during a respiratory cycle. A mathematical description of the pulmonary gas metabolism process indicates the presence of a self-control mechanism in pulmonary gas metabolism. It is shown that the intrapulmonary pressure is the one single controlled variable which is instrumental in controlling all the numerous gas mass transfer processes taking place in the lung.

V.Z.

**A74-25020 # An attachment to an electrocardiograph for recording the pulse curve (Pristavka do elektrokardiografa dlia reestratsii krivoi pul'su).** O. N. Lebid' (Ministerstvo Zdravookhrameniia Ukrain'skoi SSR, Meditsinskii Institut, Lugansk, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 20, Jan.-Feb. 1974, p. 129-131. In Ukrainian.

**A74-25031 # Models of auditory mechanisms (Modeli mekhanizmov slukha).** V. K. Labutin and A. P. Molchanov. Moscow, Izdatel'stvo Energiia, 1973. 200 p. 181 refs. In Russian.

Current theories concerning information processing by the auditory analyzer are set forth, with emphasis on the mathematical and physical aspects of auditory data processing. Several mathematical and physical models of signal analysis mechanisms in the auditory analyzer are described. The models represent the activities of the membrane, of the hydroacoustic structures of the ear, of auditory

neural mechanisms, of auditory adaptation, of stimulus recognition and of frequency selection. The application of such models to technological processes is also considered. V.Z.

**A74-25037 #** Conflicting structures /2nd revised and enlarged edition/ (Konfliktuiushchie struktury /2nd revised and enlarged edition/). V. A. Lefevr. Moscow, Izdatel'stvo Sovetskoe Radio, 1973. 160 p. 39 refs. In Russian.

In this monograph, the phenomenon of consciousness in complex systems is considered. Special attention is given to reflex processes taking place in the presence of conflict conditions. The author attempts to find new approaches toward the solution of problems that mar the performance of computers in such tasks as those of automated translation from one language into another. Discussed topics include the algebra of reflex processes, focal points, and reflex polynomials, reflex regulation, control of reflex-regulation processes, devices turning misgivings into realities, reflex relations in collective bodies, and Janus cosmology. M.V.E.

**A74-25338** Actin and myosin in non-muscle cells. R. Adelstein (National Institutes of Health, National Heart and Lung Institute, Bethesda, Md.). *New Scientist*, vol. 61, Feb. 7, 1974, p. 346-348.

It has been found that actin and myosin, the proteins which generate the mechanical power of muscles, are not confined to muscle cells. Molecules remarkably similar to these proteins have now been isolated in cells located in the brain, blood platelets, nerve axons, and fibroblasts. It appears quite possible that actin and myosin-like molecules play an important part in cell motility, secretion, and division. Questions concerning the control of the interaction of cellular actin and myosin are presently investigated. G.R.

**A74-25391 \*** Remote sensing - A new view for public health. D. R. Morrison, C. M. Barnes (NASA, Johnson Space Center, Houston, Tex.), and C. E. Fuller (NASA, Johnson Space Center, Houston, Tex.; USAF, Health Applications Office, Washington, D.C.). In: Remote sensing of earth resources; Proceedings of the Second Conference on Earth Resources Observation and Information Analysis System, Tullahoma, Tenn., March 26-28, 1973. Volume 2. Tullahoma, Tenn., F. Shahrokhi, University of Tennessee, 1973, p. 99-106. 5 refs.

It is shown that the technology of remote sensing can be of great importance to the field of public health. This possibility is based on the deepened understanding of the biologies and ecologies of the vector/organism/host interrelationships of arthropod-, soil-, and water-borne diseases to result from the information that remote sensing can provide. M.V.E.

**A74-25398** Automated approach to the biological survey for pest management systems. P. D. Fisher, R. H. Caron, R. L. Walton, and D. L. Haynes (Michigan State University, East Lansing, Mich.). In: Remote sensing of earth resources; Proceedings of the Second Conference on Earth Resources Observation and Information Analysis System, Tullahoma, Tenn., March 26-28, 1973. Volume 2. Tullahoma, Tenn., F. Shahrokhi, University of Tennessee, 1973, p. 227-247. 12 refs. Research supported by the Michigan State University; NSF Grant No. GI-20.

An approach to pest insect management is shown. Through this approach multifactor control strategies can be systematically developed and modified from region to region according to day-to-day changes in weather, field, and economic factors. A method for a biological survey which is compatible with this approach to pest insect management is presented. The basic approaches for gathering the required data are described along with details concerning the hardware required for retrieving, storing and processing the raw data. Problems associated with data management and pattern recognition are discussed. An efficient algorithm for performing object isolation in an image plane is also presented and applied to three representative images. G.R.

**A74-25501 #** Energy estimates of power interactions as image-coding parameters, and the relation between these estimates and the parameters of thermodynamics (Energeticheskie otsenki silovykh vzaimodeistvii kak parametry, kodiruiushchie obraz, i svyaz' etikh otsenok s parametrami termodinamiki). V. V. Morozov. *Problemy Bioniki*, no. 11, 1973, p. 30-39. In Russian.

**A74-25502 #** Optical models for detectors of visual signal characteristics (Opticheskie modeli detektorov priznakov zritel'nykh signalov). Iu. P. Bugai, V. A. Bakhtigozin, Iu. I. Zozulia, and V. G. Chervov. *Problemy Bioniki*, no. 11, 1973, p. 40-44. In Russian.

Discussion of techniques for image perception and recognition, with emphasis on the identification of visual signals representing such image characteristics as the orientation of rectilinear sections, the positions and curvatures of curvilinear segments, line intersection points, broken lines, line ends, and other geometrical characteristics. Sets of optical models are proposed for the detection of videosegments representing such characteristics. V.Z.

**A74-25503 #** Physico-mathematical analysis and formalization of pathological thinking structures (Fiziko-matematicheskii analiz i formalizatsiia struktur patologicheskogo myshleniia). V. N. Chudakov. *Problemy Bioniki*, no. 11, 1973, p. 51-59. 10 refs. In Russian.

The basic features of mental disorders on the formal and concrete levels are analyzed. Theorems concerning egocentric transforms and the transposition of ideas to form a single notion are formulated and proved. Conditions which upset the logical algebraic properties of thinking structures are identified. A set of pathological thinking axioms is given. V.Z.

**A74-25504 #** Study of some characteristics of the support-motor system of man (Issledovanie nekotorykh kharakteristik oporno-dvigatel'noi sistemy cheloveka). R. A. Gurevich and V. A. Vnukov. *Problemy Bioniki*, no. 11, 1973, p. 66-68. In Russian.

The stability of a two-component model representing the support-motor system of man is discussed. Experimental data are used to substantiate an analysis of the nonlinear elements which are responsible for the activity of that system. Attention is given to quality control effectuated by nonlinear elements in this system. V.Z.

**A74-25505 #** Biomechanics of the accommodation system of the human eye (Biomekhanika akkomodatsionnogo apparata glaza cheloveka). V. F. Ananin. *Problemy Bioniki*, no. 11, 1973, p. 69-74. 6 refs. In Russian.

The dynamics of forces acting on the eyeball during accommodation is discussed in the context of the author's hypothesis (1968) that vision adjustment to different distances is achieved by simultaneous changes in both the outer and inner surface curvatures of the crystalline lens and the form of the eyeball producing longitudinal shift of the retina. Particular attention is given to the internal forces produced by the contraction of the accommodative

**A74-25506 #** Automatic normalization in the case of combined conversions of images (Avtomaticheskaiia normalizatsiia pri kombinirovannykh preobrazovaniiakh izobrazhenii). E. P. Putiatin, B. K. Lopatchenko, V. B. Levikov, and O. M. Abramov. *Problemy Bioniki*, no. 11, 1973, p. 75-80. In Russian.

**A74-25507 #** Design principles for opto-electronic models of homogeneous biological systems with lateral inhibition and propagating stimulation (Printsipy postroeniia optoelektronnykh modelei odnorodnykh biologicheskikh sistem s lateral'nym tormozheniem i rasprostraniiaushchimsia vozbuzhdeniem). F. D. Dubinin. *Problemy Bioniki*, no. 11, 1973, p. 95-102. 11 refs. In Russian.

**A74-25508 #** Instrument methods for modeling the process of complex image analysis (Apparatnye metody modelirovaniia protsessov analiza slozhnykh izobrazhenii). V. P. Romanov and S. S.

Tereshchenko. *Problemy Bioniki*, no. 11, 1973, p. 111-120. 9 refs. In Russian.

A mathematical basis is set forth for visual analysis of complex images by modeling the biological analysis process on scanner-coder systems which search for and detect image components and measure image parameters by simulation of steps of work of the visual analyzer. A diagram of a computerized scanner-coder modeling circuit with feedbacks is included. Errors and complexity of two-dimensional image processing by a scanner are indicated. Suggestions are given for improving these image analysis technique. A mathematical model is proposed for an optimal scanner-coder image analysis system. V.Z.

**A74-25509 #** **An electrooptical conversion model and an algorithm for scanning of complex graphic images (Ob odnoi modeli elektronno-opticheskogo preobrazovaniia i algoritme osmotra slozhnykh graficheskikh izobrazhenii).** S. S. Tereshchenko and V. P. Romanov. *Problemy Bioniki*, no. 11, 1973, p. 120-125. In Russian.

**A74-25510 #** **The problem of an axiomatic construction of a theory of thinking (K voprosu ob aksiomaticheskom postroenii teorii myshleniia).** V. N. Chudakov. *Problemy Bioniki*, no. 11, 1973, p. 125-136. 16 refs. In Russian.

**A74-25575** **Masseteric and digastric reflex activity during conditioned sensorimotor rhythm.** M. I. Babb and M. H. Chase (California, University, Los Angeles, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 36, Apr. 1974, p. 357-365. 38 refs. Grants No. PHS-NS-09999; No. PHS-MH-10083.

An investigation was undertaken to obtain more information concerning the mechanisms responsible for the decrease in motor activity associated with the sensorimotor rhythm (SMR). Jaw reflexes were examined because they are not directly related to a postural stance or visceral responses. It was found that the masseteric reflex is suppressed during the generation of SMR, whereas the digastric reflex remains essentially unchanged. G.R.

**A74-25605 #** **Maximum cardiac output related to sex and age.** M. Miyamura and Y. Honda (Kanazawa University, Kanazawa, Japan). *Japanese Journal of Physiology*, vol. 23, Dec. 1973, p. 645-656. 32 refs.

An investigation was conducted of the effect of increasing age on maximum cardiac output. The subjects studied were normal healthy males and females. It was found that the average maximum cardiac output increased with advancing age until adolescence in both sexes. In the male, maximum cardiac output progressively increased until about 18 years. The maximum cardiac output was then maintained at a plateau level until about 24 years and decreased successively afterwards with increasing age. G.R.

**A74-25625 \* #** **The medical story.** R. S. Johnston, L. F. Dietlein, and E. L. Michel (NASA, Johnson Space Center, Houston, Tex.). *American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 10th, Washington, D.C., Jan. 28-30, 1974, Paper 74-287*. 28 p.

An overview of the Skylab medical program is given. All medical subsystems provided in the orbital workshop functioned satisfactorily. Major systems included the food system, the waste management system, and provisions per personal hygiene. A series of lockers in the wardroom was used to stow the inflight medical support system. Cardiovascular counter pressure garments were launched in the orbital workshop for all three crews. Life services experiments were carried out. Two experiments were conducted in the Skylab missions to study the performance of the cardiovascular system during weightless flight and return to earth and the one g environment. A series of experiments was conducted to study mineral balance and the bioassay of body fluids. F.R.L.

## STAR ENTRIES

**N74-17807\*#** IIT Research Inst., Chicago, Ill. Life Sciences Div.

**SURVIVAL OF INFECTIOUS MICROORGANISMS IN SPACE CABIN ENVIRONMENTS** Final Report, Jun. 1973 - Jan. 1974

Stanley C. Vana and Richard Ehrlich Jan. 1974 26 p refs (Contract NAS9-12778)

(NASA-CR-134194; ITRI-L6066-3) Avail: NTIS HC \$4.50 CSCL 06M

Aerosol survival and virulence of *S. aureus* and *P. aeruginosa* cultures isolated during exposure to simulated space cabin environment was studied using the microthread captured aerosol technique. The aerosol survival of *P. aeruginosa* isolates did not differ significantly from that of the original culture from which the isolates were obtained. The mean death rate of the isolates was 1.03%/min and that of the controls 1.10%/min. Similarly exposure to the 5 psi environment did not affect the virulence of *P. aeruginosa*. Both strains of *S. aureus* (ITRI and NASA) after exposure to 5 psi environment showed some degree of adaptation to this environmental stress. The aerosol death rates of the isolated organisms were 5 to 10-fold lower than of the original cultures. At the same time the virulence of the isolates was approximately 5-fold higher than that of the original culture. Author

**N74-17808\*#** Techtran Corp., Glen Burnie, Md.

**PATHOGENIC ACTION OF THE ATMOSPHERE**

N. N. Sirotnin Washington NASA Feb. 1974 57 p refs Transl. into ENGLISH from the book "Patologicheskaya Fiziologiya Ekstremal'nykh Sostoyaniy" Moscow, Meditsina Press, 1973 p 36-70

(Contract NASw-2485)

(NASA-TT-F-15315) Avail: NTIS HC \$6.00 CSCL 06P

The effects of variation atmospheric pressure (hypobaria, hyperbaria) on various parts of the living organism are examined at length. Separate treatment is devoted to the role of low partial oxygen pressure and to hyperoxia primarily in the production of pathological phenomena. Author

**N74-17809\*#** Kanner (Leo) Associates, Redwood City, Calif. **EXPERIMENTAL ULCERS INDUCED BY FORCED IMMOBILIZATION IN THE WHITE RAT. 2: ANATOMOPATHOLOGY OF THE GASTRIC LESIONS DEVELOPMENT OF ULCERATIONS AFTER ENDING IMMOBILIZATION**

S. Bonfils, C. Richir, F. Potet, G. Liefvooghe, and A. Lambling Washington NASA Feb. 1974 18 p refs Transl. into ENGLISH from Rev. Franc. Etudes Clin. Biol. (Paris), v. 4, 1959 p 888-894

(Contract NASw-2481)

(NASA-TT-F-15379) Avail: NTIS HC \$4.00 CSCL 06S

Gastric ulcers induced by forced immobilization of rats were studied. The lesions were found to be multiple in 67 to 90% of the cases; complete healing occurred by the ninth day in 80% of the animals with no chronic ulceration. Microscopic study showed the fundamental lesion to be a slough which detaches, leaving the ulcer. Predominant in the histologic pattern were vascular changes in the form of capillary pits. Glandular redifferentiation occurred next to the formative scar. Associated visceral lesions included fatty infiltration of the liver as well as the presence of vacuoles in the renal tubular epithelial cells. Author

**N74-17810\*#** Techtran Corp., Glen Burnie, Md.

**PARADOX OF SLEEP MEMORIZATION IN RATS AS A RESULT OF DELAYED SLEEP**

P. Leconte and E. Hennevin Washington NASA Feb. 1974 4 p refs Transl. into ENGLISH from J. Physiol. (Paris), suppl., v. 65, Oct. 1972 p 255A-256A

(Contract NASw-2485)

(NASA-TT-F-15380) Avail: NTIS HC \$4.00 CSCL 06C

Experiments carried out on 36 rats prove that avoidance conditioning is followed by an increase in duration of paradoxal sleep (PS). When as much as 180 minutes is allowed between conditioning and the possibility of sleep, no significant modification of PS length is noted. Author

**N74-17811\*#** Kanner (Leo) Associates, Redwood City, Calif. **THE PHYSIOLOGICAL EFFECTS OF ACCELERATION ON ASTRONAUTS**

L. Tabusse and P. M. Pingannaud Washington NASA Feb. 1974 22 p refs Transl. into ENGLISH from Rev. Fr. Astronaut. (France), v. 3, 1967 p 11-19

(Contract NASw-2481)

(NASA-TT-F-15384) Avail: NTIS HC \$4.25 CSCL 06S

The physiopathological effects of types of acceleration varying in direction of application, intensity, and duration are discussed. Reasons are given for the selection of a take-off position allowing the astronaut to receive the accelerative force transversally. Studies of the oxygen saturation level of the arterial blood are reviewed with attention to the influence of this factor on the psychomotor response capability of the individual. Cardiorespiratory problems, including pulmonary collapse, are given particular attention, and there is some discussion of changes in cell morphology and the problem of weight loss due to dehydration. Author

**N74-17812\*#** Techtran Corp., Glen Burnie, Md.

**GASTRIC ULCERS IN RATS CAUSED BY RESTRAINT IN A METAL TUBE**

R. Lambert, M. S. Martin, and F. Martin Washington NASA Mar. 1974 6 p refs Transl. into ENGLISH from Compt. Rend. Soc. Biol. (Paris), v. 161, 20 Mar. 1967 p 816-818

(Contract NASw-2485)

(NASA-TT-F-15388) Avail: NTIS HC \$4.00 CSCL 06S

Proof was gathered that conditions of restraint in a metal tube can cause gastric ulcers in rats. The female rat proved to be more susceptible to ulcers than the males. Author

**N74-17813\*#** Techtran Corp., Glen Burnie, Md.

**LESIONS OF THE DIGESTIVE SYSTEM DETERMINED BY FORCED IMMOBILIZATION IN PIGS**

C. Labie, H. LeBars, and J. Tournut Washington NASA Feb. 1974 7 p refs Transl. into ENGLISH from Compt. Rend. Soc. Biol. (Paris), v. 160, 17 Mar. 1966 p 675-677

(Contract NASw-2485)

(NASA-TT-F-15389) Avail: NTIS HC \$4.00 CSCL 06S

Pigs subject to experimental restraint by forced immobilization for 24 hours showed in all cases phenomena of sanguine stasis in the gastric mucous membranes and, with 80% of the subjects, ulcers of the fundus mucous. The pancreas of these animals showed lesions of ischemic necrosis which was rather intense and the medullo-suprarenal was in a state of degranulation. The suprarenal and vascular modifications appear to be concomitant and not consecutive and probably have as their origin a central nervous disturbance. Author

**N74-17814\*#** Techtran Corp., Glen Burnie, Md.

**REPERCUSSIONS OF RESTRAINT ON THERMAL REGULATION IN THE WHITE RAT KEPT AT DIFFERENT ENVIRONMENTAL TEMPERATURES**

M. Prioux-Guyonneau Washington NASA Feb. 1974 8 p refs Transl. into ENGLISH from Compt. Rend. Soc. Biol. (Paris), v. 164, 27 Jan. 1970 p 72-75

(Contract NASw-2485)

(NASA-TT-F-15392) Avail: NTIS CSCL 06S

The effects of restraint on thermal regulation are studied using rats kept at various environmental temperatures. Considerations of length of restraint at varying temperatures and relationship of temperature to which returned to recovery are given. Author

**N74-17815\*# Kanner (Leo) Associates, Redwood City, Calif. THE COURSE OF TRAUMATIC SHOCK IN DOGS SUSTAINING PROLONGED HYPODYNAMIA**

B. R. Yaremenko Washington NASA Mar. 1974 6 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 15 Mar. - Apr. 1971 p 83-84 (Contract NASw-2481)

(NASA-TT-F-15395) Avail: NTIS HC \$4.00 CSCL 06S

Following a 2-week hypodynamia, traumatic shock developed in dogs after infliction of a somewhat greater trauma than in the control, but, following a 28-day hypodynamia, much less trauma was required for development of shock. Regardless of duration of hypodynamia, the survival period of experimental animals was much less than that of the controls. Author

**N74-17816\*# Kanner (Leo) Associates, Redwood City, Calif. CONTRIBUTION TO THE STUDY OF THE ACTION OF THE ADRENOCORTICAL GLANDS ON THE PRODUCTION OF GASTRIC ULCERATIONS IN THE RAT BY PROLONGED IMMOBILITY**

A. Sner, M. Dinu, V. Stroia, E. Constantin, and I. Nitulescu Washington NASA Mar. 1974 13 p refs Transl. into ENGLISH from Fiziol. Norm. Patol. (Bucharest), v. 15, 1969 p 307-315 (Contract NASw-2481)

(NASA-TT-F-15410) Avail: NTIS HC \$4.00 CSCL 06S

Experiments were carried out on male rats, restrained by a special system of immobilization for 24 hr. Weight variations and the mortality rate were investigated, as well as the ulcerated gastric area and urinary eliminations of uropepsin, 17-ketosteroids and 17-hydroxycorticosteroids. Intact animals subjected to immobilization had a mortality of 11%. Immobilization of the adrenalectomized animals induced a mortality of 44%, whereas immobilization combined with the administration of cortisone permitted survival of all animals. Gastric lesions were produced in 78% of the immobilized animals. This increased to 100% in animals subjected to immobilization associated with cortisone and dropped to 44% in adrenalectomized and immobilized rats. None of the controls (rats not immobilized but kept on a fasting diet for the duration of the experiment) exhibited any lesions of the gastric mucosa. Author

**N74-17817\*# Institute for Research, Houston, Tex. DEVELOPMENT OF CONCEPT FOR CONCURRENT BIOCIDIC GENERATION AND WATER SYSTEM PURIFICATION Final Report**

[1974] 78 p (Contract NAS9-12998)

(NASA-CR-134204) Avail: NTIS HC \$7.00 CSCL 06I

An attempt was made to construct an electrochemical system, using iodine, for water purification in Skylab. Data cover measurements of iodine production rates, effect of electrode size and geometry on iodine production rates, and feasibility of using stainless steels as reference electrodes. Author

**N74-17818\*# Techtran Corp., Glen Burnie, Md. KINETOSIS**

A. N. Razumeyev Washington NASA Mar. 1974 27 p refs Transl. into ENGLISH from the book "Patologicheskaya Fiziologiya Ekstremal'nykh Sostoyaniy" Moscow, Meditsina Press, 1973 p 332-348

(Contract NASw-2485)

(NASA-TT-F-15324) Avail: NTIS HC \$4.50 CSCL 06E

Various aspects of kinetosis are reported. Studies of motion sickness, air sickness, automobile sickness, spacecraft sickness, etc., are outlined. Certain mechanisms of the vestibular apparatus, nystagmus, the vegetative nervous system, and somatic nerves are considered and neurophysiological explanations of possible mechanisms of motion sickness and ways of countering them are given. A review of the world literature on these subjects is included. Author

**N74-17819\*# Pan American Univ., Edinburg, Tex.**

**EXPERIMENTAL TEST OF PLANT CANOPY REFLECTANCE MODELS ON COTTON Semiannual Report**

Edwin W. LeMaster [1973] 8 p refs (Grant NGR-44-087-001)

(NASA-CR-137095) Avail: NTIS HC \$3.00 CSCL 02C

Spectroradiometric data on the bidirectional reflectance function was collected for a cotton canopy as a function of observer zenith angle, observer angle, and solar zenith angle. The area under study was about 40 miles from the Gulf of Mexico and the prevailing winds blew inland such that cloud formation increased during the day. The standard reflectance panel was constructed of plywood that had been spray painted with a flat white latex paint. Physical and optical plant parameters were measured. A time lapse mechanism was constructed to operate a 16 mm movie camera such that single frames could be exposed at intervals of one per second up to one per hour. Data were digitized from a strip chart recorder and reflectance panel measurements. J.A.M.

**N74-17820# Joint Publications Research Service, Arlington, Va.**

**CONCISE HANDBOOK ON SPACE BIOLOGY AND MEDICINE, PART 1**

A. I. Burnazyan, ed., O. G. Gazenko, ed., V. V. Parin, ed. et al 15 Feb. 1974 242 p Transl. into ENGLISH of the book "Kratkiy Spravochnik po Kosmicheskoy Biologii i Meditsine" Moscow, Med., 1972 390 p

(JPRS-61236-1-Pt-1) Avail: NTIS HC \$15.25

More than 2,000 definitions of terms are presented that are used in theoretical and applied space biology and medicine and related fields associated with the support of manned flights aboard spaceships and in orbital stations. Author

**N74-17821# Joint Publications Research Service, Arlington, Va.**

**CONCISE HANDBOOK ON SPACE BIOLOGY AND MEDICINE, PART 2**

A. I. Burnazyan, ed., O. G. Gazenko, ed., V. V. Parin, ed. et al 15 Feb. 1974 283 p Transl. into ENGLISH from the book "Kratkiy Spravochnik po Kosmicheskoy Biologii i Meditsine" Moscow, Meditsina, 1972 390 p Revised

(JPRS-61236-2-Pt-2) Avail: NTIS HC \$17.25

The second part of the handbook continues definitions of terms used in theoretical and applied space biology and medicine and related fields and associated with the support of manned flights aboard spaceships and in orbital stations. Author

**N74-17822# Joint Publications Research Service, Arlington, Va.**

**SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 8, NO. 1, 1974**

15 Mar. 1974 142 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 1, 1974

(JPRS-61487) Avail: NTIS HC \$10.25

Reported aeromedical research aims to quarantine safety on long space flights and the reliability of the human component in the man spaceship system.

**N74-17823 Joint Publications Research Service, Arlington, Va. EFFECT OF TRANSMERIDIONAL FLIGHTS ON THE HUMAN BODY**

S. I. Stephanova In its Space Biol. and Aerospace Med., Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 1-14 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 1, 1974 p 3-12

The pertinent literature is reviewed. The functions which have exhibited desynchronization after transmeridional flights are described and the relationship between the time of synchronization of circadian rhythms in the body and local time and the level of the time change, individual factors, geographical direction of the flight (to the west or east) and the outgoing and return flight is

discussed. Recommendations on how to reduce the negative effect of transmeridional flight on flight personnel, athletes and businessmen are presented. Author

**N74-17824** Joint Publications Research Service, Arlington, Va.  
**PROBLEMS IN SPACE RADIOBIOLOGY AND RADIATION SAFETY OF SPACE FLIGHTS**

C. A. Tobias and Yu. G. Grigoryev *In its Space Biol. and Aerospace Med.* Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 15-26 Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 1, 1974 p 12-21

The main criteria are presented for evaluating the radiation hazards of different space flights and qualitative characteristics of these criteria. Results of radiobiological investigations in space are given and approaches to determination of the admissible levels of exposure of cosmonauts to irradiation are described. Author

**N74-17825** Joint Publications Research Service, Arlington, Va.  
**STATISTICAL DYNAMICS OF OXYGEN CONSUMPTION BY MAN DURING MODERATE PHYSICAL WORK**

V. K. Vasilyev *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 27-34 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 1, 1974 p 21-27

Transient processes of oxygen consumption by man performing moderate physical exercises (about 600 kgm/min) are described mathematically. The processes recorded experimentally are described by different second degree differential equations, the right hand of which are a functions of the load. Mathematical expectations and correlation functions for impulse transient functions are given. Formulas are derived for the first two statistical moments for perturbation to the oxygen partial pressure control circuit in a sealed chamber. The data obtained are used in analyzing and selecting the performance of the oxygen partial pressure control circuit in a life support system. Author

**N74-17826** Joint Publications Research Service, Arlington, Va.  
**USE OF BIOMECHANICS IN INVESTIGATION OF THE HUMAN CARDIOVASCULAR SYSTEM DURING PROLONGED SPACEFLIGHT**

V. M. Zaiko and V. G. Aleksandrov *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 35-40 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 1, 1974 p 27-31

Biomechanical methods can be used in studying the cardiovascular function of cosmonauts exposed to prolonged spaceflight. An adequate mathematical model of a pulsating blood flow in the arteries which has been formulated using the biophysical mechanism of myogenic autoregulation associated evolutionarily with gravity helps in calculating cardiovascular parameters on the basis of hemodynamic characteristics measured indirectly in spaceflight. The model also makes it possible to select physiologically sound criteria for determining the duration of a prolonged spaceflight. Author

**N74-17827** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF ELECTRIC STIMULATION OF THE MEDULLA OBLONGATA ON THE ELECTROCARDIOGRAM AND SOME INDICES OF BLOOD CIRCULATION AND RESPIRATION**

B. B. Yegorov and S. A. Skuratova *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 41-48 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 1, 1974 p 31-36

The effects of electric stimulation of the rabbit medulla oblongata on arterial pressure, the EKG, respiration and the EEG of the cortex and subcortical structure of the brain were investigated. In most cases stimulation of the medulla oblongata was accompanied by an increase in partial pressure, a decrease

in the pulse rate and an increase in respiration rate. It also induced synchronization in the cortex and regulation of the rhythm in subcortical formations. No significant correlation was found between EEG changes and autonomic parameters. Author

**N74-17828** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF ADEQUATE STIMULATION OF THE VESTIBULAR APPARATUS ON IMPULSE ACTIVITY OF SPINAL INTERNEURONS**

G. S. Ayzikov and A. V. Mokrousova *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 49-56 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 1, 1974 p 36-41

The spontaneous impulse activity of plates seven to nine of the lumbosacral part of the spinal cord was studied during adequate stimulation of the otoliths. The following four types of response were discriminated: Increase and decrease in impulse activity, appearance of salvo activity at definite moments in movement of the stand with the animals, and the absence of changes in rhythm of the neurons. It was noted that the period of stimulation of the otoliths is accompanied by phasic changes in the rhythm of interneurons which disappear with cessation of swinging. The noted changes - quickening or thinning of impulse activity - can persist for a long time during the period of the after-effect of vestibular stimulation. Author

**N74-17829** Joint Publications Research Service, Arlington, Va.  
**EXTRASECRETORY FUNCTION OF THE LIVER AND ENZYME SECRETORY FUNCTION OF THE PANCREAS IN RATS AFTER EXPOSURE TO ACCELERATIONS**

K. V. Smirnov, I. L. Medkova, and L. G. Goland *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 57-62 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 1, 1974 p 41-45

The extrasecretory function of the liver and the enzyme secretory function of the pancreas in rats were studied during the immediate aftereffect period of exposure to transverse accelerations of 10 g for 20 minutes. The biochemical analysis of the main components of bile and the activity of pancreatic enzymes in the pancreas and blood exhibited an increase in the lipid concentration, activation of lipolytic enzymes and inhibition of the activity of amylase and trypsin. These changes were exhibited three hours after the exposure. The changes in the secretory functions of the liver and pancreas seem to be associated with hemodynamic disturbances which develop in the liver and pancreas immediately after an exposure to accelerations. Author

**N74-17830** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF ACCELERATIONS ON THE ACTIVITY OF ASPARTATE AMINOTRANSFERASE OF THE EXTERNAL AND INTERNAL MEMBRANES OF MITOCHONDRIA**

I. D. Yertanov and L. A. Rubashkina *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 63-66 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med.* (Moscow), v. 8, no. 1, 1974 p 45-47

Exposure of rats to transverse accelerations of 36 g for six minutes decreased the specific activity of aspartate aminotransferase of the outer and inner membranes of mitochondria. It is concluded that the decrease was not associated with the intramitochondrial movement of enzyme molecules. This may be brought about by an inactivation of the enzyme by the specific inhibitor or by conformational changes in the structure which followed the formation of the enzyme membrane complex. Author

**N74-17832** Joint Publications Research Service, Arlington, Va.  
**PSYCHOPHYSIOLOGICAL CHANGES IN AN AIRMAN'S ACTIVITY UNDER THE INFLUENCE OF ALCOHOL**

B. M. Pikovskiy *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 75-79 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 1, 1974 p 53-56

Alcohol-induced changes in the human body exert a negative effect on man's activity and therefore should be regarded as generalized noise in functioning of the man machine system. Disturbances in human activity may occur both in the perception and evaluation of information and in the motor responses. Insignificant doses of alcohol taken before flight or its aftereffect contribute to in-flight emergency situations. Safety measures should include up-to-date methods for the diagnosis of alcohol intoxication and widespread propaganda indicating that the day before the flight and on the day of the flight aircraft personnel must not drink. Author

**N74-17833** Joint Publications Research Service, Arlington, Va. **USE OF DIFFERENT METHODS FOR STUDYING SMALL GROUPS APPLICABLE TO GROUP SCREENING PROBLEMS**

N. A. Gosudarev *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 80-87 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 1, 1974 p 56-61

The possibility of prolonged group space flights makes the optimum selection of space crews very important. A series of methods for evaluating the psychological compatibility of crew members has been developed on the basis of theoretical and methodological findings in group selection systems. These methods were used in studying the personality relationships among members of isolated groups which were exposed to conditions similar to spaceflight as well as personality responses as a function of the position occupied by an individual in the group. The use of the methods is illustrated by examinations of skiers who traversed an arctic region. Author

**N74-17834** Joint Publications Research Service, Arlington, Va. **FUNCTIONAL TEST WITH DECOMPRESSION OF THE LOWER BODY IN THIRTY-DAY ANTIORTHOSTATIC HYPOKINESIA**

V. A. Degtyarev, A. D. Voskresenskiy, N. D. Kalmykova, and Z. A. Kirillova *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 88-92 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 1, 1974 p 61-65

During a 30-day hypokinetic experiment nine test subjects underwent functional tests with LBNP applied at -35 and -45 mm Hg for ten minutes. Subjectively they tolerated the tests well. Cardiovascular responses were similar to orthostatic responses but less pronounced. During hypokinesia the response to the tests increased. A statistical analysis of the relationship between the heart rate and integral evaluations revealed a correlation between responses to LBNP of -45 mm Hg and the orthostatic load. This indicates the possibility of predicting orthostatic reactions on the basis of LBNP tests. Author

**N74-17835** Joint Publications Research Service, Arlington, Va. **INFLUENCE OF THIRTY-DAY HYPOKINESIA IN COMBINATION WITH EXPOSURE TO LBNP ON TOLERANCE TO ACCELERATIONS (Gz PLUS)**

P. M. Suvorov *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 93-97 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 1, 1974 p 65-68

The effect of hypokinesia combined with LBNP on tolerance to accelerations was studied. Before and after hypokinesia the subjects were centrifuged at 3 g for 30 sec and at 5 g as long as it could be tolerated. Two days after exposure to hypokinesia and LBNP the duration of tolerance to accelerations of 5 g was 24.2-36.5% of the initial level. This may be brought about by the functional activity of the muscular system and venous tone

which results in a marked decrease in systolic volume and cardiac output during exposure to accelerations and accordingly in the early development of optic disturbances. Author

**N74-17836** Joint Publications Research Service, Arlington, Va. **ROENTGENOLOGICAL STUDY OF CARDIAC FUNCTION AND MINERAL SATURATION OF BONE TISSUE AFTER THIRTY-DAY HYPOKINESIA**

I. G. Krasnykh *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 98-103 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 1, 1974 p 68-71

Before and on the fourth day of a 30-day bedrest experiment the cardiac size and output, as well as the contractile function of the myocardium were measured using teleroentgenokymograms. Bone densities of the right heel bone and the first phalanx of the fifth finger on the right hand were determined roentgenophotometrically. In the early recovery period the cardiac size, cardiac output and the force of cardiac contractions decreased whereas the heart rate increased. Bone density also decreased. The countermeasures applied -- physical exercises, lower body negative pressure and muscle electrostimulation -- reduced changes but did not eliminate them entirely. Author

**N74-17837** Joint Publications Research Service, Arlington, Va. **EFFECT OF 30-DAY HYPOKINESIA IN COMBINATION WITH LBNP TRAINING ON SOME INDICES OF THE FUNCTIONAL STATE OF THE CARDIOVASCULAR SYSTEM AT REST**

A. N. Aleksandrov and A. K. Kochetov *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 104-105 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 1, 1974 p 71-72

The effects of 30-day bedrest and LBNP training on the functional state of the cardiovascular system at rest were studied in two groups of test subjects. A moderate decline in tone and a delay in blood rate flow were noted in the leg vessels (mainly venules). The systolic blood volume decreased. The cardiac output at first decreased and then gradually increased, reaching the initial level by the 30th day, due to an increase in the heart rate. The changes in the EKG T wave suggested metabolic changes in the myocardium. These changes in the EKG were more distinct in test subjects who were daily subjected to LBNP training. Author

**N74-17838** Joint Publications Research Service, Arlington, Va. **REACTIONS OF THE CARDIOVASCULAR SYSTEM DURING 30-DAY SIMULATION OF WEIGHTLESSNESS BY MEANS OF ANTIORTHOSTATIC HYPOKINESIA**

A. V. Beregovkin and V. V. Kalinichenko *In its Space Biol. and Aerospace Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 106-112 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 1, 1974 p 72-77

Cardiovascular reactions of nine healthy male test subjects were investigated during 30-day bedrest with their heads tilted down 4 deg from the horizontal. During bedrest tests the subjects exhibited moderate changes in the functional state of the cardiovascular system. The use of preventive measures -- physical exercises, lower body negative pressure and muscle electrostimulation -- had a favorable effect on cardiovascular conditioning. This was suggested by a faster recovery of the functional state of the cardiovascular system after completion of the experiment. Antiorthostatic hypokinesia is an acceptable weightlessness stimulation method in selecting preventive measures of cardiovascular deconditioning. Author

**N74-17839** Joint Publications Research Service, Arlington, Va. **DYNAMICS OF SOME INDICES OF THE CARDIAC FUNCTION AND ITS CORRELATION WITH SYSTEMIC**

**CIRCULATION DURING THE DAY IN MAN**

I. Ye. Oranskiy, V. V. Skryabin, V. S. Sakovich, and A. Ye. Myakota  
*In its Space Biol. and Aerospace Med.*, Vol. 1, No. 8, 1974  
 (JPRS-61487) 15 Mar. 1974 p 113-118 refs Transl. into  
 ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8,  
 no. 1, 1974 p 77-80

Examinations of 60 persons revealed a certain circadian  
 periodicity of their cardiac function which was dependent in general  
 on their mental and physical activity. The correlations of conjugated  
 parameters of cardiodynamics and hemodynamics were varied  
 and associated with many factors that often were not taken  
 into account. Author

**N74-17840** Joint Publications Research Service, Arlington, Va.  
**FISTULA TUBE AND REGIME OF FORCED FEEDING OF  
 EXPERIMENTAL ANIMALS**

N. T. Svistunov *In its Space Biol. and Aerospace Med.*, Vol. 8,  
 No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 119-124 refs  
 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow),  
 v. 8, no. 1, 1974 p 80-84

The new design of a stomach fistula tube for feeding  
 experimental animals is reported that consists of a sleeve with  
 a flange made from titanium alloy covered with a biologically  
 inert plastic butacryl. The method for its implantation and the  
 regime selected for feeding the animals are also described. G.G.

**N74-17841** Joint Publications Research Service, Arlington, Va.  
**MAN'S TOLERANCE TO CHEST-BACK TRANSVERSE  
 ACCELERATIONS**

Ye. B. Shulzhenko, I. F. Vil-Vilyams, T. N. Krupina, V. I. Pervushin,  
 and M. P. Aleksandrova *In its Space Biol. and Aerospace Med.*,  
 Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 125-127  
 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med.  
 (Moscow), v. 8, no. 1, 1974 p 84-85

Physiological reactions characterizing man's tolerance to  
 transverse accelerations were studied for chest-back positions  
 at acceleration range from 3 to 8 g. The exposure time relationship  
 was established from the following tolerance criteria: general  
 and muscle fatigue, flabbiness sensation in lower extremities  
 and numbness of feet, breathing difficulty, impairment of vision,  
 and disturbance of cardiac activity rhythm. An acceleration of  
 8 g generally produced increased changes in the EKG. G.G.

**N74-17842** Joint Publications Research Service, Arlington, Va.  
**MODULATING INFLUENCE OF THE OTOLITHS ON  
 REFLEXES OF THE SEMICIRCULAR CANALS**

A. A. Lakoza and A. A. Shipov *In its Space Biol. and Aerospace  
 Med.*, Vol. 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974  
 p 128-131 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm.  
 Med. (Moscow), v. 8, no. 1, 1974 p 85-87

Reflex interaction of the cupular-endolymphatic and otolithic  
 systems is studied in connection with the appearance of autonomic  
 impairments in some cosmonauts during space flight; this is  
 identified with the motion sickness syndrome and is caused by  
 different etiological factors, especially the impairment in functional  
 interaction of the mentioned systems. The influence of otolithic  
 formations on the reflexes from the semicircular canals are  
 investigated by using models of a unilateral labyrinthectomy on  
 change in the frequency of fallout nystagmus in the case of  
 tilts of the animal in different directions. Author

**N74-17843** Joint Publications Research Service, Arlington, Va.  
**THRESHOLD VALUES OF CORIOLIS ACCELERATION  
 DURING MAN'S ROTATION WITH HEAD MOVEMENTS IN  
 THE SAGITTAL AND FRONTAL PLANES**

F. A. Solodovnik *In its Space Biol. and Aerospace Med.*, Vol.  
 8, No. 1, 1974 (JPRS-61487) 15 Mar. 1974 p 132-135  
 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med.  
 (Moscow), v. 8, no. 1, 1974 p 87-89

The threshold values are determined for coriolis accelera-  
 tions acting on the vestibular apparatus during man's rotating  
 with movement of the head in the sagittal and frontal planes.

Author

**N74-17844\*** Kanner (Leo) Associates, Redwood City, Calif.  
**NEW TECHNIQUES FOR PRODUCING GASTRIC ULCERA-  
 TIONS IN THE WHITE RAT: THE ULCER OF CON-  
 STRAINT**

G. Rossi, S. Bonfils, F. Liefoggh, and A. Gambling Washington  
 NASA Mar. 1974 6 p refs Transl. into ENGLISH from  
 Compt. Rend. Soc. Biol. (Paris), v. 150, 8 Dec. 1956  
 p 2124-2126

(Contract NASw-2481)

(NASA-TT-F-15382) Avail: NTIS HC \$4.00 CSCL 06S

A technique for producing gastric ulceration, consists of the  
 immobilization of a rat in wire netting for 20 hours. Forty-two  
 out of 44 rats exhibited clear ulcerations of the gastric ventricle,  
 permitting the assumption that a fundamental mechanism of  
 gastric functioning was touched. Author

**N74-17845\*** Kanner (Leo) Associates, Redwood City, Calif.  
**DEPENDENCE OF PATHOMORPHOLOGICAL CHANGES IN  
 THE GASTRIC MUCOSA ON THE FUNCTIONAL CONDI-  
 TION OF THE CORTEX AND SUBCORTICAL FORMATIONS  
 OF THE BRAIN**

P. F. Kryshen, A. A. Kolpakov, Yu. I. Tkach, I. V. Sakovich, and  
 N. A. Chuich Washington NASA Mar. 1974 9 p refs  
 Transl. into ENGLISH from Patol. Fiziol. i Eksperim Terapiya  
 (Moscow), v. 16, no. 6, 1972 p 48-51

(Contract NASw-2481)

(NASA-TT-F-15396) Avail: NTIS HC \$3.00 CSCL 06P

It was shown in experiments on rats that a 24-hour forced  
 immobilization induced two states in the animal body: agitation,  
 followed by inhibition. Electrocardiograms, electrophthalmograms,  
 electrocerebellograms, EKG and respiration and pulse rates,  
 as well as macroscopic examination and microscopic histologi-  
 cal studies established a direct relationship between inhibition  
 of the central nervous system and the cardiovascular, respiratory  
 and muscular systems and pathomorphological changes in the  
 stomach, liver and intestine, as well. Inhibition in the central  
 nervous system set in the following order: cortex of the cerebellar  
 Vermis, hypothalamus and cortex of the cerebral hemispheres.  
 Changes in the stomach, intestinal and liver tissues and the  
 congestion phenomena arising lead to the appearance of  
 hemorrhages in the gastrointestinal tract. Author

**N74-17846\*** Techtran Corp., Glen Burnie, Md.  
**THE SYNTHESIS OF ADENOSINE-5-CHLORACETOPH-  
 ONATE: A SPECIFIC INHIBITOR OF ACETYL-CoA-SYN-  
 THETASE**

N. N. Gulyayev and L. A. Baranova Washington NASA Mar.  
 1974 8 p refs Transl. into ENGLISH from Dokl. Akad. Nauk  
 SSSR (Moscow), v. 213, no. 2, 1973 p 335-337

(Contract NASw-2485)

(NASA-TT-F-15421) Avail: NTIS HC \$4.00 CSCL 06O

A description for the preparation of the acetyl-CoA-  
 synthetase inhibitor adenosine-5'-chloracetophosphonate. The  
 processes used by the authors to obtain the compound are given.  
 One mention is made of an in vitro experiment performed using  
 a rabbit's heart. Enzymatic production was decreased in the  
 presence of the compounds. Author

**N74-17847\*** National Aeronautics and Space Administration,  
 Lyndon B. Johnson Space Center, Houston, Tex.  
**BONE MINERAL MEASUREMENT FROM APOLLO EXPERI-  
 MENT M-078**

John M. Vogel (Public Health Service Hospital, San Francisco),  
 Paul C. Rambaut, and Malcolm C. Smith Jan. 1974 40 p  
 refs

(NASA-TM-X-58110; JSC-08680) Avail: NTIS HC \$5.00 CSCL  
 06S

Loss of mineral from bone during periods of immobilization,  
 recumbency, or weightlessness is examined. This report describes  
 the instrumentation, technique, and bone mineral changes

observed preflight and postflight for the Apollo 14, 15, and 16 missions. The bone mineral changes documented during the Apollo Program are reviewed, and their relevance to future missions is discussed. Author

**N74-17848#** Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung e. V., Graftschaft (West Germany). Inst. fuer Aerobiologie.

**INVESTIGATIONS ON SKIN PROTECTION AGAINST HIGHLY TOXIC PHOSPHORIC ACID ESTERS [UNTERSUCHUNGEN ZU EINEM HAUTSCHUTZ GEGENUEBER HOCHTOXISCHEN PHOSPHORSÄURE-ESTERN]**

G. Schreiber and H. Herring Bonn Bundeswehramt 1973 38 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. der Verteidigung

(BMVg-FBWT-73-30) Avail: NTIS HC \$5.00; Bundeswehramt, Bonn 30 DM

Skin penetration of the alkyl phosphates, diisopropyl fluorophosphate (DFP) and n,n-dimethylamino-O-ethylcyano phosphate (Tabun), was investigated, in vitro and in vivo, in guinea pigs and rats. As a basis for the development of skin barrier creams (formulations), a series of polyethylene glycols was chosen. For some formulations a short-time inhibition of Tabun-penetration in vitro was found, which could not be verified in vivo. In vivo all formulations gave an enhancement of penetration. Mixed with Tabun (10:1) polyethylene glycol 400 strongly diminished the penetration of the former substance.

ESRO

**N74-17849#** Army Medical Research Lab., Fort Knox, Ky. [STUDIES IN SENSORY PSYCHOPHYSIOLOGY, THE BIOLOGICAL EFFECTS OF LASER RADIATION, AND METHODOLOGY RELATED TO THE PRESERVATION, TRANSFUSION, COLLECTING, PROCESSING, AND SHIPMENT OF HUMAN BLOOD] Annual Progress Report, 1 Jul. 1972 - 30 Jun. 1973

30 Jun. 1973 93 p refs (DA Proj. 3A0-61102-A-91C; DA Proj. 3A0-61102-B-71P; DA Proj. 3A0-61102-B-71R; DA Proj. 3A0-62110-A-821) (AD-771568) Avail: NTIS CSCL 06/5

The research and development effort at the U.S. Army Medical Research Laboratory, Fort Knox, Kentucky, is concerned with studies in sensory psychophysiology, the biological effects of laser radiation, and methodology related to the preservation, transfusion, collecting, processing, and shipment of human blood. The progress during Fiscal Year 1973 and the current status of the various work units are reported herein.

Author (GRA)

**N74-17850#** Webb Associates, Yellow Springs, Ohio.

**METABOLIC RATE DURING SLEEP Final Report** Paul Webb and Mahlon Hiestand Aug. 1973 36 p refs (Contract F33615-72-C-1875; AF Proj. 7222) (AD-771024) Avail: NTIS CSCL 06/16

Twenty men between 19 and 63 years of age were studied for two nights of sleep by recording electroencephalography, electrooculography, and electromyography in standard configuration to allow scoring for sleep stages 1, 2, 3, 4, and rapid eye movement. At the same time oxygen consumption was measured continuously with a Metabolic Rate Monitor. Heart rate was recorded continuously, and the overnight decrease in rectal temperature and body weight was determined. Because of a clear first night effect, second night data were selected for analysis. There was no evident relationship between sleep stage and oxygen consumption. Mean oxygen consumption for the 20 men was 275 ml/min plus or minus 100 ml/min (standard deviation). Heart rates were found to average as low as 49 and as high as 71 beats/min. One surprising observation was that most of the older subjects exhibited periodic breathing at various times during the night. Nine of 11 men older than 45 had bouts of apnea alternating with mild hyperventilation. None of the nine men younger than 45 showed it. Periodic breathing occurred primarily during sleep stage 2, less often during REM and stage 1.

Author (GRA)

**N74-17851#** Duke Univ., Durham, N.C. School of Engineering.

**HEAT AND MASS TRANSFER IN THE HUMAN RESPIRATORY TRACT AT HYPERBARIC PRESSURES Progress Report**

L. Sigfred Linderth, Jr. and Ernest A. Kuonen May 1973 284 p refs

(Contract N00014-67-A-0251-0018; NR Proj. 101-895) (AD-771370) Avail: NTIS CSCL 06/19

The primary objective of this study is to model the simultaneous heat and momentum transfer in the lower respiratory tract using metal pipe. The inlet gas temperature for this study was kept near 80F, and the wall temperature near 118F, giving approximately the same temperature differential between the tube walls and the gas stream. A hot wire anemometer, coupled to a micromanipulator was used to take both temperature and velocity measurements. Readings were taken at thirty horizontal and thirty vertical equispaced radial positions. Data was recorded on a digital printer and reduced by appropriate programs. The anemometer calibration curve was included in the reduction programs. Experimental velocity and temperature profiles are presented in two and three dimensional format. An analysis of an overall heat transfer coefficient for each branch and each bifurcation is presented. A bulk temperature was calculated at each axial position and from this data an overall heat transfer coefficient was determined. (Modified author abstract) GRA

**N74-17852#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**FOUNDATIONS OF SPACE BIOLOGY AND MEDICINE, VOLUME 2, PART 3, CHAPTER 3: IMPACT ACCELERATIONS**

James W. Brinkley and Henning E. VonGierke May 1973 75 p refs

(AF Proj. 7231) (AD-771612; AMRL-TR-73-68-Vol-2-Pt-3-Ch-3) Avail: NTIS CSCL 06/19

The problem most specific to space medicine is the potential change of impact tolerance due to reduced bone mass and muscle strength caused by prolonged weightlessness and physical inactivity. Considerably more research is required as space missions will be extended over many weeks and months. The relationship between bone strength, bone mass and muscle strength must be explored as a function of gravitational load, isotonic and isometric exercise, time pattern and diet; for osteoporosis of disuse appropriate time scaling factors for bone dynamics as a function of gravitational exposure and activity time patterns must be established relating animal experiments to human conditions. Changes in injury patterns due to these changes in the musculoskeletal system must be known and understood. GRA

**N74-17853\*** National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.

**METERING GUN FOR DISPENSING PRECISELY MEASURED CHARGES OF FLUID Patent**

Thomas A. Cook (McDonnell-Douglas Corp., Huntington Beach, Calif.) and Hans Scheibe, inventors (to NASA) (McDonnell-Douglas Corp., Huntington Beach, Calif.) Issued 5 Feb. 1974 8 p Filed 28 Jun. 1972 Supersedes N72-28098 (10 - 19, p 2517) Sponsored by NASA

(NASA-Case-MFS-21163-1; US-Patent-3,790,037; US-Patent-Appl-SN-266925; US-Patent-Class-222-324; US-Patent-Class-224-444) Avail: US Patent Office CSCL 06/1

A cyclically operable fluid dispenser for use in dispensing precisely measured charges of potable water aboard spacecraft is described. The dispenser is characterized by (1) a sealed housing adapted to be held within a crewman's palm and coupled with a pressurized source of potable water; (2) a dispensing jet projected from the housing and configured to be received within a crewman's lips; (3) an expandable measuring chamber for measuring charges of drinking water received from the source; (4) and a dispenser actuator including a lever extended from the housing to be digitated for initiating operational cycles.

whereby precisely measured charges of potable water selectively are delivered for drinking purposes in a weightless environment.  
Official Gazette of the U.S. Patent Office

**N74-17854\*#** Martin Marietta Corp., Denver, Colo.  
**SHUTTLE PASSENGER COUCH Final Report**  
A. A. Rosener and M. L. Stephenson Jan. 1974 120 p  
(Contract NAS9-13010)  
(NASA-CR-134200; MCR-74-40) Avail: NTIS HC \$9.00 CSCL 06Q

Conceptual design and fabrication of a full scale shuttle passenger couch engineering model are reported. The model was utilized to verify anthropometric dimensions, reach dimensions, ingress/egress, couch operation, storage space, restraint locations, and crew acceptability. These data were then incorporated in the design of the passenger couch verification model that underwent performance tests. G.G.

**N74-17855#** Flying Personnel Research Committee, London (England).  
**TESTING PREDICTIONS DERIVED FROM A MODEL OF PROGRESSIVE ADAPTATION TO CORIOLIS ACCELERATIONS**

A. J. Benson, J. T. Keason, and E. Diaz Jul. 1971 20 p refs (FPRC/1311) Avail: NTIS HC \$4.00

A theoretical model for progressive adaptation to Coriolis accelerations is described. Thirteen subjects are tested under procedures using diminishing velocity increments, with an initial step of 3 rev/min. The findings provide positive, but as yet, limited support for the theoretical model described. Author

**N74-17856#** Joint Publications Research Service, Arlington, Va.

**ALGORITHM OF OPERATOR ACTIVITIES IN PROCESS OF TARGET CLASSIFICATION ON RADAR SCOPE**

A. Kh. Gildeyev, T. M. Strokova, E. A. Ulanov, and I. N. Khutoryan 25 Feb. 1974 9 p refs Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 4, 1973 p 139-143 (JPRS-61303) Avail: NTIS HC \$4.00

Construction of an algorithm is reported that describes operator activities in the classification of objects observed on the radar scope and which can be used for compatibility evaluation of the CRT output system with psychophysiological features of the operator and for synthesizing the optimum scope-operator function. Author

**N74-17857\*#** National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

**THE CHEMICAL/PHYSICAL AND MICROBIOLOGICAL CHARACTERISTICS OF TYPICAL BATH AND LAUNDRY WASTE WATERS**

Warren D. Hypes, Carmen E. Batten, and Judd R. Wilkins Washington Mar. 1974 31 p refs  
(NASA-TN-D-7566; L-9365) Avail: NTIS HC \$3.25 CSCL 06I

Chemical/physical and microbiological characteristics are studied of typical bath and laundry waters collected during a 12 day test in which the untreated waste waters were reused for toilet flush. Most significant changes were found for ammonia, color, methylene blue active substances, phosphates, sodium, sulfates, total organic carbon, total solids, and turbidity in comparison with tap water baseline. The mean total number of microorganisms detected in the waste waters ranged from 1 million to 10 to the 7th power cells/ml and the mean number of possible coliforms ranged from 10 to the 5th power to 1 million. An accumulation of particulates and an objectionable odor were detected in the tankage used during the 12 day reuse of the untreated waste waters. The combined bath and laundry waste waters from a family of four provided 91 percent of the toilet flush water for the same family. Author

**N74-17858\*#** National Aeronautics and Space Administration, Pasadena Office, Calif.

**AN IMPROVED HEAT STERILIZABLE PATIENT VENTILATOR Patent Application**

Alexander S. Irons (JPL), Paul P. Muehter (JPL), and Willie D. Kent, inventors (to NASA) (JPL) Filed 7 Mar. 1974 22 p (Contract NAS7-100)  
(NASA-Casa-NPO-13313-1; US-Patent-Appl-SN-449153) Avail: NTIS HC \$4.25 CSCL 06L

A modified heat sterilizable patient ventilator is disclosed. The ventilator is characterized by a ported center body, a shell formed of heat sterilizable material mounted on the center body and defining a hermetically sealed reservoir for confining under positive pressure a mixture of bacteria free gas, and a pneumatic circuit including an oxygen delivery jet coupled with an absolute filtration system for delivering a bacteria free mixture of gases to the reservoir. NASA

**N74-17859#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**PSYCHOLOGICAL CONSIDERATIONS IN THE DESIGN OF HELMET MOUNTED DISPLAYS AND SIGHTS: OVERVIEW AND ANNOTATED BIBLIOGRAPHIES Final Report**

Richard L. Huhges, L. Ralph Chason, and Jock C. H. Schwank Aug. 1973 95 p refs

(AF Proj. 7184)  
(AD-770993; AMRL-TR-73-16) Avail: NTIS CSCL 05/10

An overview of the history and the known and potential psychological problems of helmet-mounted displays is followed by an extensive annotated bibliography of relevant material arranged by topics: eye dominance, brightness disparity, helmet-mounted displays/helmet-mounted sights, retinal rivalry, and the AMD visually-coupled systems symposium (of 1972). The bibliography annotations, which vary in length from one sentence to one-half of a page, describe the contents of the articles but do not evaluate them. Most of the bibliographic entries are not listed in previously published articles on helmet-mounted displays and/or sights. Author (GRA)

**N74-17860#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**MINIMIZATION METHODS IN THE DEVELOPMENT OF BIODYNAMIC MODELS**

H. T. Mohlman, H. E. Krause, H. L. Oestreicher, and H. L. Vogt Sep. 1973 6 p refs Presented at 21st Intern. Congr. of Aviation and Space Med., Munich, 17-21 Sep. 1973 (Contract F33615-72-C-1402; AF Proj. 7231)

(AD-770992; AMRL-TR-73-86) Avail: NTIS

Mechanical vibrations disturb physiological processes and can inflict injuries. Dynamic forces produce internal relative displacements which interfere with physiological events and thus determine human tolerance. These events must be analyzed if the response of the body under vibrations is to be understood. Customary dynamic analysis is based on a model of the system which is a combination of lumped masses, spring factors, and damping factors, or it is an individual or a combination of continuous elements. The dynamics can now be formulated and quantitatively evaluated. The purpose of this paper is to demonstrate the feasibility of mathematical techniques that do not require prior knowledge of a specific model structure. The procedures derive both model structure and values for the model parameter by minimizing the differences between model performance and experimental observation. GRA

**N74-17861#** Calspan Corp., Buffalo, N.Y.  
**PERFORMANCE EVALUATION OF THE GENERAL MOTORS HYBRID 2 ANTHROPOMORPHIC TEST DUMMY Final Report, 17 Feb. - 17 Apr. 1973**

J. Sam Miller Sep. 1973 179 p refs  
(Contract DOT-HS-053-3-603)  
(PB-225005/8GA; CALSPAN-SZ-5272-V-1; DOT-HS-800919) Avail: NTIS HC \$5.25 CSCL 13F

A series of twelve static and dynamic component tests were performed to measure the Hybrid 2 dummy in accordance with the purchase description test procedures and specifications. Twenty belt restraint tests and twenty air bag restraint tests were performed using an accelerator sled to simulate a 30-mph impact crash. The dynamic performance of the dummies was statistically the same in terms of absolute value and variability of the measured parameters. The Hybrid 2 dummy exhibits

statistically the same variability as the Alderson hybrid dummy previously tested, but has significantly different absolute values for the dynamic test parameters. GRA

**N74-17862#** Naval Aerospace Medical Research Lab., Pensacola Fla.

**NAVAL FLIGHT OFFICER FUNCTION ANALYSIS. FINAL REPORT: COMMONALITY OF OPERATIONAL FUNCTIONS**

Medical Research Progress Report no. 2

Richard E. Doll 2 Nov. 1973 160 p

(MF 51.524)

(AD-771375; NAMRL-1194) Avail: NTIS CSCL 05/9

During 1972, the Naval Aerospace Medical Research Laboratory (NAMRL) conducted a series of investigations analyzing the operational functions of the Naval Flight Officer (NFO). A major part of that series involved the determination of the tasks performed by the NFO in various aircraft. For each of the NFO positions a Function Description Inventory (FDI) was developed. The purpose of this part of the study was to develop a compendium of functions encompassing all the duties and tasks contained in the various FDIs, to have this compendium reviewed by NFO personnel of all the respective operational squadrons and to do a cross-comparison based on these data to provide information as to which NFO communities perform the tasks and to what extent. (Modified author abstract) GRA

**N74-17863#** Life Sciences, Inc., Hurst, Tex.

**TEST OF A MODEL OF VISUAL SPATIAL DISCRIMINATION AND ITS APPLICATION TO HELICOPTER CONTROL** Annual Summary Report, 1 Jun. 1972 - 31 May 1973

J. A. Bynum, W. G. Matheny, J. E. Flexman, and R. K. Wilson Nov. 1973 56 p refs

(Contract DADA17-72-C-2110)

(AD-771041; LSI-TR-73-1) Avail: NTIS CSCL 05/10

The investigation tested a model which hypothesizes that the critical visual cue for control of a helicopter is the relationship between a fixed internal referent placed on the helicopter windscreen and an external referent placed on the ground plane. To investigate the likelihood that a pilot could maintain vehicular control through detecting changes in the inter-referent distances, both laboratory and field experiments were designed. The laboratory investigation was concerned with verifying the Weber ratio. The field investigation was devised to permit the filming of pilots: eye movements and measurement of system performance in three translational degrees of freedom during hovering flight. (Modified author abstract) GRA

**N74-17864#** Air Force Human Resources Lab., Brooks AFB Tex.

**DESCRIPTION AND RESULTS OF THE AIR FORCE RESEARCH AND DEVELOPMENT PROGRAM FOR THE IMPROVEMENT OF MAINTENANCE EFFICIENCY** Final Report

John P. Foley, Jr. Nov. 1973 46 p refs

(AF Proj. 1710)

(AD-771000; AFHRL-TR-72-72) Avail: NTIS CSCL 05/9

The paper, one of three prepared for a 1972 symposium, and its accompanying slides give an overview of the Air Force research and development program for the improvement of maintenance efficiency. It emphasizes the use of the task analysis process in all efforts. Although the central theme emphasizes the job performance aids efforts attention is also given to job oriented training and job task performance tests. The results of two experiments are briefly summarized. In addition, a 1972 demonstration combining job performance aids with job oriented training is described. In this demonstration eight high and eight average electronic aptitude subjects were able to perform most types of flight line and field shop maintenance for a Doppler radar and its computer. (Modified author abstract) GRA

**N74-17865#** Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.

**FEASIBILITY OF A NOVEL TECHNIQUE FOR ASSESSING**

**NOISE-INDUCED ANNOYANCE** Final Report, Jul. 1972 Jan. 1973

Sanford Fidell, Glenn Jones, and Karl S. Pearsons Sep. 1973 107 p refs

(Contract DOT-OS-20103)

(PB-225334/2GA; BBN-2423; DOT-TST-74-3) Avail: NTIS HC \$4.25 CSCL 05J

The feasibility of a novel technique for assessing human response to community noise exposure was explored in a field study employing prototype instrumentation. Test participants residing in a wide range of noise environments wore wristwatch-like signalling devices to indicate annoyance; simultaneous measurement of noise exposure was made by special monitoring equipment. It was found that test participants in the pilot study produced consistent data which was amenable to detailed analyses of the nature of annoyance per se, as well as the relationships between annoyance and noise exposure. Author (GRA)

**N74-17866#** Army Missile Command, Redstone Arsenal, Ala. Aeroballistics Directorate.

**TIME SERIES ANALYSIS OF GUNNER TRACKING ERROR**

Nancy R. Rich, Maureen M. Wise, Latricha Greene, John Howerton, and Mark C. K. Yang 3 Oct. 1973 182 p refs

(DA Proj. 1M2-63301-D-699)

(AD-771933; RD-TR-73-35) Avail: NTIS CSCL 19/5

The report includes the time series analysis of gunner error data and the formulation of a simulation model to be used in future applications. Author (GRA)

**N74-18459\*** National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

**VISUAL LIGHT FLASH PHENOMENON**

L. S. Pinsky (Houston Univ.), W. Z. Osborne (Houston Univ.), and J. V. Bailey In its Apollo 17 Prelim. Sci. Rept. 1973 6 p refs

CSCL 06P

Light flash phenomenon observed by crewmen on Apollo 14, 15, 16, and 17 are analyzed. The passage of cosmic rays through the crewman's head and eyes was recorded by the Apollo light flash moving emulsion detector. Events of all the light flash observations are tabulated. It is suggested that the most probable explanation of the phenomenon is that it is caused by cosmic rays penetrating the eyes and retinas of the observers. F.O.S.

**N74-18577** Joint Publications Research Service, Arlington, Va. **FIFTH INTERNATIONAL CONFERENCE ON MAGNETIC RESONANCE IN BIOLOGICAL SYSTEMS**

N. M. Emanuel, L. P. Kayushin, and Ya. I. Azhipa In its Vestn. of the USSR Acad. of Sci., No. 7, Jul. 1973 p 103-106 refs Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (Moscow), no. 7, Jul. 1973 p 77-78 Conf. held at New York, 4-8 Dec. 1972

Methods of EPR, NMR and double resonance are reported for studying structures and functions of individual molecules and organelles; mentioned are investigations on hemoglobin, enzymes and their reactions, radiation effects on DNA, biological membranes, muscle proteins, and clinical applications to detect cancerous tissues. G.G.

**N74-18614** National Research Council of Canada, Ottawa (Ontario).

**BIOENGINEERING DEVELOPMENTS: PAST, PRESENT AND FUTURE**

J. A. Tanner and C. Romero-Sierra (Queen's Univ., Kingston) In its Quart. Bull. of the Div. of Mech. Eng. and the Natl. Aeron. Estab. 31 Dec. 1973 p 1-4

The physiological effects of electromagnetic fields to determine the interaction between the organism and its environment were investigated. It was determined that the interaction between non-ionizing electromagnetic fields with living organisms can produce the following effects: (1) demyelination or hypermyelination of peripheral nerves, (2) coupling with EEG activity, (3) disorientation of birds, (4) increase in egg production accompanied by a decrease in longevity, (5) improved wound healing through

increased formation of collagen, (6) changes in water metabolism of plants, and (7) stimulation of sensory modalities in biological materials and structures. Author

**N74-18616** Queens Univ., Kingston (Ontario).  
**INTERACTION OF ELECTROMAGNETIC FIELDS AND LIVING SYSTEMS WITH SPECIAL REFERENCE TO BIRDS**

C. Romero-Sierra, J. A. Tanner (NRC), and J. BigudelBlanco /n NRC Quart. Bull. of the Div. of Mech. Eng. and the Natl Aeron. Estab. 31 Dec. 1973 p 27-49 refs

Interaction between non-ionizing electromagnetic radiation and living systems is one of the basic life processes. Examples of such interaction are given with particular reference to the effects of microwaves on birds. A model is offered based on a working hypothesis of the law of orientation of birds in the migratory state. Intensity of microwave radiation is discussed in relation to three identifiable levels: (1) heating effects, (2) thermal, non-heating effects, and (3) non-thermal effects. The basis for distinction is given. A new concept of safety level of non-ionizing radiation is presented together with a proposal for expressing such levels in terms of the field vectors instead of power flux density. The presently existing hazard to mankind from the wide scale application of microwave power is weighed against the potential benefits that would follow mastery of the laws of interaction. Author

**N74-18739** Texas A&M Univ., College Station.  
**RESPONSE OF SELECTED MICROORGANISMS TO A SIMULATED MARTIAN ENVIRONMENT Ph.D. Thesis**

Terry Lynn Foster 1973 99 p  
 Avail: Univ. Microfilms Order No. 74-1010

Microorganisms capable of growth at 7 C were enumerated and isolated from soil samples from the manufacture area (Denver, Colorado) and assembly area (Cape Kennedy, Florida) of the Viking spacecraft. Temperature requirements were determined for these isolates, and those growing at 3 C, but not at 32 C were designated as obligate psychrophiles. These were identified to major generic groups, and the population density of obligate psychrophiles from the various groups was determined. It was found that soil samples from the manufacture area contained obligate psychrophiles, none of which was a sporeformer, which comprised about 15% of the population isolated at 7 C. The samples from Cape Kennedy contained psychrophilic populations which made up about 16% of the population isolated at 7 C, and 5% of these were aerobic sporeformers. Dissert. Abstr.

**N74-18740** Michigan Univ., Ann Arbor.  
**RADIATION PROTECTION GUIDES FOR LONG RANGE SPACE MISSIONS, VOLUME 1. RADIOLOGICAL HEALTH ASPECTS OF FABRICATING OPERATIONS WITH THORIATED METALS, VOLUME 2 Ph.D. Thesis**

Julian Manly Earls 1973 144 p  
 Avail: Univ. Microfilms Order No. 74-661

Radiation protection guides for future space missions are established based on evaluation of data on effects of conventional radiation exposures on animals and man. Airborne radioactivity levels due to the use of thoriated electrodes for welding operations are reexamined. These results are compared to hazards due to the use of other thoriated metals for machining operations. It is concluded that except for sanding and cutting operations, there is no significant difference between the radiological health hazards due to the use of thoriated tungsten electrodes and other 2 percent thoriated materials. Dissert. Abstr.

**N74-18741** University of Southern Calif., Los Angeles.  
**APPARENT ADRENAL AND PULMONARY ACCUMULATION TO A HYPEROXIC HYPOBARIC ENVIRONMENT Ph.D. Thesis**

Billy Joe Pfoff 1973 157 p  
 Avail: Univ. Microfilms Order No. 73-31663

The purpose of this study was to evaluate the effects on the pulmonary and adrenal cortex structures in mice after

long-duration exposure to 100 percent oxygen at a partial pressure of 632 mm Hg and below. The findings show that the pulmonary structures were the most vulnerable target for oxygen toxicity when exposed to increased partial pressures of oxygen. However, it appears that in mice, an adaptive process can occur which can enable them, when exposed to progressively increasing oxygen partial pressures, to survive long-term exposure to an environment where survival would not normally be possible. It appears that this adaptation involves hematological, metabolic, hormonal, and nervous system interaction and adjustment. Dissert. Abstr.

**N74-18743\*** Techtran Corp., Glen Burnie, Md.  
**THE EFFECT OF WEIGHTLESSNESS AND DECREASED GRAVITATION**

Ye. A. Kovalenko Washington NASA Mar. 1974 32 p refs  
 Translation into ENGLISH from "Deystviye Nevesomosti i Ponizhennoy Gravitatsii" Moscow, Meditsina Press, 1973 p 312-332  
 (Contract NASw-2485)

(NASA-TT-F-15323) Avail: NTIS HC \$4.75 CSCL 06S

Effects of weightlessness and diminished gravitation are discussed as reflected in data obtained from terrestrial simulated experiments and from spaceflight data. Conclusions are drawn to the effect that weightlessness causes extensive metabolic and functional changes in both human and animal organisms. Weightlessness is one of the primary factors causing detraining as an insurmountable problem and success has been achieved in preconditioning astronauts for weightlessness. The disadvantages of aircraft simulator experiments are pointed out as are many problems in this field which yet remain unsolved. Author

**N74-18744\*** Techtran Corp., Glen Burnie, Md.  
**THE EFFECT OF REPEATED RESTRICTIONS OF MOTOR ACTIVITY UPON SYSTOLIC BLOOD PRESSURE OF ALBINO RATS**

M. Poppei and K. Hecht Washington NASA Mar. 1974 12 p refs  
 Transl. into ENGLISH from Acta Biol. Med. Ger. (Berlin), v. 27, 1971 p 297-306  
 (Contract NASw-2485)

(NASA-TT-F-15390) Avail: NTIS HC \$4.00 CSCL 06S

The influence of repeated restrictions of motor activity on systolic blood pressure was examined for seven and a half months in 54 male and female albino rats. With increasing duration of restraint, blood pressure readings from 114 to 146 torr with a high of 240 were obtained. Blood pressure remained high for five weeks following the experiment, leading to the conclusion that the effects are chronic. Author

**N74-18745#** Joint Publications Research Service, Arlington, Va.

**HORIZONS IN SPACE BIOLOGY AND MEDICINE**

N. Gurovskiy 28 Mar. 1974 21 p Transl. into ENGLISH from various Russian publications  
 (JPRS-61600) Avail: NTIS HC \$4.25

Aerospace medicine data were applied to ordinary medicine, gravitational biology, and an artificial biosphere experiment.

**N74-18746** Joint Publications Research Service, Arlington, Va.  
**SPACE MEDICINE AND ITS CONTRIBUTION TO HUMAN WELFARE**

N. Gurovskiy and A. Koshkov /n its Horizons in Space Biol. and Med. (JPRS-61600) 28 Mar. 1974 p 1-4 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow), 31 Dec. 1973 p 3

Aerospace overloading effects on the human body are studied and applied to physiology, psychology, and hygiene of man on earth. Equipment used for monitoring man in space is applied to systems for observing very ill patients in clinics and hospitals and also for observing human performance in sports. A return to general practicing in medicine is proposed rather than specializing in a narrow field; this is made possible by the use of computer data banks. J.A.M.

**N74-18747** Joint Publications Research Service, Arlington, Va.  
**APPLICABILITY OF FINDINGS IN SPACE MEDICINE IN ORDINARY MEDICINE**

N. Gurovskiy and A. Yegorov *In its Horizons in Space Biol. and Med. (JPRS-61600)* 28 Mar. 1974 p 5-9 Transl. into ENGLISH from Izv. (Moscow). 5 Jan. 1974 p 5

The lack of knowledge in the medical profession, concerning the requirements or definition of a healthy human, is discussed. New methods made possible by aerospace technology were used to detect latent disorders and to manufacture reliable medical instrumentation for constant remote monitoring. J.A.M.

**N74-18748** Joint Publications Research Service, Arlington, Va.  
**GRAVITATIONAL BIOLOGY**

N. Dubinin *In its Horizons in Space Biol. and Med. (JPRS-61600)* 28 Mar. 1974 p 10-13 Transl. into ENGLISH from Pravda (Moscow). 6 Jan. 1964 p 3

The effects of gravitation on animal and plant life when they emerged from the sea to live on land are reviewed. The post flight physiological changes in cosmonauts are discussed, including the impairment of sensorimotor, vestibular, and neuromuscular systems and coordination of vertical pose movement. Heredity and the changes in molecular structure due to weightlessness are also considered. J.A.M.

**N74-18749** Joint Publications Research Service, Arlington, Va.  
**EXPERIMENT WITH AN ARTIFICIAL BIOSPHERE DESCRIBED**

B. Kononov *In its Horizons in Space Biol. and Med. (JPRS-61600)* 28 Mar. 1974 p 14-19 Transl. into ENGLISH from Izvestiya (Moscow). 27 Oct. 1973 p 5

An experiment is described where human subjects spent six months in an artificial biosphere. This biosphere was made of four 75 cubic meter compartments. The first compartment consisted of a shower, wardroom, kitchen, miniworkshop, and living quarters. The other three compartments comprised plant gardening (wheat, vegetables, and *Chlorella* algae). The plants were used to give oxygen and take up the carbon dioxide expended by the subjects. J.A.M.

**N74-18750\*** Lovelace Foundation for Medical Education and Research, Albuquerque, N.Mex. Dept. of Physiology.  
**SPECIALIZED PHYSIOLOGICAL STUDIES IN SUPPORT OF MANNED SPACE FLIGHT Annual Research Report.**

3 Jan. - 31 Dec. 1973  
 U. C. Luft Feb. 1974 46 p refs  
 (Contract NAS9-12572)

(NASA-CR-134210) Avail: NTIS HC \$5.50 CSCL 06S

Research in aerospace medicine is presented. The reports discussed include: circulatory and respiratory transients during and after orthostasis and the effects of beta adrenergic blockade; the determination of total body water by an ethanol dilution method; and increased total respiratory conductance breathing 100% oxygen (forced oscillation method). F.O.S.

**N74-18751\*** Techtran Corp., Glen Burnie, Md.  
**A NEW METHOD TO PRODUCE AORTIC ANEURYSMS IN RABBITS BY EXPERIMENTALLY RESTRICTING THEIR MOVEMENT**

W. W. Tjawokin Washington NASA Mar. 1974 8 p Transl. into ENGLISH from Arch. Pathol. Anat. Physiol. (West Berlin). v. 351, 1970 p 340-346

(Contract NASw-2485)

(NASA-TT-F-15394) Avail: NTIS HC \$4.00 CSCL 06S

The thoracic aortas of 12 male chinchilla rabbits were constricted to various degrees by ligatures and the animals subjected to varying degrees of immobility confinement to investigate the question as to whether these factors contribute to the development of aortic aneurysms. Studies indicate the development of aortic aneurysms depends on the degree of restriction of movement, and the degree of constriction of the aorta by the ligature. Author

**N74-18752\*** Techtran Corp., Glen Burnie, Md.

**EFFECT OF SHOCK WAVES**

P. I. Burenin Washington NASA Mar. 1974 23 p refs Transl. into ENGLISH from the publ. "Patologicheskaya Fiziologiya Ekstremal'nykh Sostoyaniy" Moscow, Med., 1973 p 312-322 (Contract NASw-2485)

(NASA-TT-F-15317) Avail: NTIS HC \$4.25 CSCL 06S

Studies of the pathogenetic effects of shock waves from explosions are reviewed. The characteristics of an air blast are described. The interaction of such a blast on the human body, and the mechanism of resulting damage are investigated with particular attention being devoted to the role of air blast parameters in injuries, and to the characteristics of pathogenesis for direct injuries. The problems associated with protection against and treatment of air blast injury are examined. Author

**N74-18753\*** Techtran Corp., Glen Burnie, Md.

**X-RAY CINEMATOGRAPHIC STUDIES OF THE CENTRAL CIRCULATORY ORGANS DURING THERAPEUTIC BATHS AND DURING HYDROSTATIC PRESSURE INCREASE. THEIR TECHNIQUE, RESULTS AND DEVELOPMENTAL POSSIBILITIES**

Friedrich Ekert Washington NASA Mar. 1974 28 p refs Transl. into ENGLISH from Arch. Physik. Therapie (Leipzig). v. 6, 1956 p 66-82

(Contract NASw-2485)

(NASA-TT-F-15398) Avail: NTIS HC \$4.50 CSCL 06S

The use of bath tubs of various shapes, ranging from shallow flat to tall structure the height of a man in which subjects and patients were subjected to X-ray kinematography, is discussed. The changes in size and function of the heart and lungs were recorded and studied during therapeutic baths and hydrostatic pressure increase. Author

**N74-18754\*** National Aeronautics and Space Administration, Washington, D.C.

**FIFTH SYMPOSIUM ON THE ROLE OF THE VESTIBULAR ORGANS IN SPACE EXPLORATION**

1973 275 p refs Symp. held at Pensacola, Fla., 19-21 Aug. 1970

(NASA-SP-314; LC-72-600319) Avail: NTIS MF \$1.45; SOD \$4.05 CSCL 06P

Vestibular problems of manned space flight are investigated for weightlessness and reduced gravity conditions with emphasis on space station development. Intensive morphological studies on the vestibular system and its central nervous system connections are included.

**N74-18756\*** National Aeronautics and Space Administration, Washington, D.C.

**FINDINGS ON AMERICAN ASTRONAUTS BEARING ON THE ISSUE OF ARTIFICIAL GRAVITY FOR FUTURE MANNED SPACE VEHICLES**

Charles A. Berry *In its Fifth Symp. on the Role of the Vestibular Organs in Space Exploration* 1973 p 15-22 refs

**CSCL 06S**

Findings for American astronauts are reviewed that may indicate some alteration in vestibular response related to exposure to zero gravity. Of 25 individuals participating in Apollo missions 7 through 15, nine have experienced symptomatology that could be related to motion sickness. The apparent divergence between these results and those from the Soviet space program, which initially appears great, may reflect the greater emphasis given by Soviet investigators to vestibular aberrations. Presently the incidence of motion sickness, long known as an indicator of vestibular disturbance, seems too low to warrant any positive statement regarding inclusion of an artificial gravity system in future long term space missions. Where motion sickness has occurred, adaptation to weightlessness has always resulted in abatement of symptoms. In the absence of biomedical justification for incorporating artificial gravity systems in long term space flight vehicles, engineering considerations may dictate the manner in which the final ballot is cast. Author

**N74-18757\*** National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

# **AN OVERVIEW OF ARTIFICIAL GRAVITY**

Ralph W. Stone, Jr. *In its Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973* p 23-33 refs

CSCL 05E

The unique characteristics of artificial gravity that affect human performance and physiology in an artificial gravity environment are reviewed. The rate at which these unique characteristics change decreases very rapidly with increasing radius of a rotating vehicle used to produce artificial gravity. Reducing their influence on human performance or physiology by increasing radius becomes a situation of very rapidly diminishing returns. A review of several elements of human performance has developed criteria relative to the sundry characteristics of artificial gravity. A compilation of these criteria indicates that the maximum acceptable rate of rotation, leg heaviness while walking, and material handling are the factors that define the minimum acceptable radius. The ratio of Coriolis force to artificial weight may also be significant. Based on current knowledge and assumptions for the various criteria, a minimum radius between 15.2 and 16.8 m seems desirable. Author

**N74-18758\*** Naval Aerospace Medical Research Lab., Pensacola, Fla.

# **VESTIBULAR MECHANISMS UNDERLYING CERTAIN PROBLEMS IN A ROTATING SPACECRAFT**

Ashton Graybiel *In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973* p 35-39 refs

CSCL 06S

Vestibular side effects are discussed with the aid of a conceptual framework based on an analysis of vestibular input-output relations. These side effects tend to fall into two main categories: (1) Reflex phenomena, and (2) motion sickness, a delayed epiphenomenon. Although the symptomatology of motion sickness is similar wherever experienced, both the eliciting stimuli and the opportunity to adapt may differ in different motion environments. These differences not only are exemplified when motion sickness is compared in a weightless and in a rotating environment, but they also point to important differences in the problem of preventing (or treating) motion sickness in these two very different environments. Author

**N74-18760\*** National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

# **DESIGN OF EXPERIMENTAL STUDIES OF HUMAN PERFORMANCE UNDER INFLUENCES OF SIMULATED ARTIFICIAL GRAVITY**

William M. Piland, H. George Hausch, Grady V. Maraman, and James A. Green (North Am. Rockwell Corp.) *In its Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973* p 55-65 refs

CSCL 05E

A ground based research program is now being undertaken to provide data concerning the effects of a rotating environment on man's ability to adequately perform gross and fine psychomotor tasks. Emphasis is being placed on establishing the levels of artificial gravity and rates and radii of rotation required in future space systems for preservation of crew performance and comfort. An experimental study utilizing a rotational facility to investigate crew mobility, cargo transfer and handling, and fine motor coordination at radii up to 24 meters and at rotational rates up to 5 rpm is reported. Author

**N74-18761\*** National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

# **LOCOMOTION IN A ROTATING ENVIRONMENT**

William Letko *In its Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973* p 67-72 refs

CSCL 05E

A rotating space station simulator is being used to obtain data on man's performance in a rotating environment. At present the facility is being used to assess the effects of rotation on

man's walking capabilities on circular and flat walls at g-levels from 0.05 to 0.75g. Some of the preliminary results are reviewed. Author

**N74-18762\*** Naval Aerospace Medical Research Lab., Pensacola, Fla.

# **SOME PHYSIOLOGICAL ASPECTS OF ARTIFICIAL GRAVITY**

D. B. Cramer and Ashton Graybiel *In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973* p 73-83 refs

CSCL 05E

The effects of increasing artificial gravity exposure on four aspects of physiological fitness are examined in four young men who, prior to exposure, were deconditioned with bed rest and water immersion. The four aspects of physiological fitness are orthostatic tolerance, exercise tolerance, forearm endurance, and maximum strength. Orthostatic tolerance was sharply reduced by deconditioning and was substantially improved by walking in simulated lunar gravity (1/6 g) for 2.5 hours daily for 7 days or by walking in 1/2 g and 1 g for 1 hour daily for 3 days. Exercise tolerance was also sharply reduced by deconditioning but did not significantly improve with increasing g-exposure. Walking in 1 g for 1 hour daily for 3 days raised exercise tolerance only a little above the low produced by deconditioning. Forearm endurance and maximum strength were relatively unaffected by deconditioning and subsequent g-exposure. Author

**N74-18763\*** Leicester Univ. (England).

# **EFFECTS OF VISUAL REFERENCE ON ADAPTATION TO MOTION SICKNESS AND SUBJECTIVE RESPONSES EVOKED BY GRADED CROSS-COUPLED ANGULAR ACCELERATIONS**

James T. Reason and Elgin Diaz *In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973* p 87-97 refs

CSCL 05E

Three groups of 10 subjects each were exposed to stepwise increments of cross coupled angular accelerations in three visual modes: internal visual reference (IVR), external visual reference (EVR), and vision absent (VA). The subjects in the IVR condition required significantly greater amounts of stimulus exposure to neutralize their illusory subjective reactions. They also suffered a greater loss of well-being and a more marked incidence of motion sickness than did subjects in the EVR and VA conditions. The same 30 subjects were reexposed to the same graded cross coupled stimulation 1 week later. This time, however, all the subjects were tested under only the IVR condition. All three groups showed some positive transfer of adaptation, but only the IVR-IVR combination required significantly fewer head motions to achieve the same level of adaptation on the second occasion. Taken overall, however, the most efficient and least disturbing route to adaptation at the completion of the second test was via the VA-IVR combination. Author

**N74-18764\*** Naval Aerospace Medical Research Lab., Pensacola, Fla.

# **PERCEPTION OF THE UPRIGHT AND SUSCEPTIBILITY TO MOTION SICKNESS AS FUNCTIONS OF ANGLE OF TILT AND ANGULAR VELOCITY IN OFF-VERTICAL ROTATION**

Earl F. Miller, II and Ashton Graybiel *In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973* p 99-103 refs

CSCL 06E

Motion sickness susceptibility of four normal subjects was measured in terms of duration of exposure necessary to evoke moderate malaise (MIIA) as a function of velocity in a chair rotated about a central axis tilted 10 deg with respect to gravitational upright. The subjects had little or no susceptibility to this type of rotation at 2.5 and 5.0 rpm, but with further increases in rate, the MIIA endpoint was always reached and with ever shorter test durations. Minimal provocative periods for all subjects were found at 15 or 20 rpm. Higher rotational rates

dramatically reversed the vestibular stressor effect, and the subjects as a group tended to reach a plateau of relatively low susceptibility at 40 and 45 rpm. At these higher velocities, furthermore, the subjects essentially lost their sensation of being tilted off vertical. In the second half of the study, the effect of tilt angle was varied while the rotation rate was maintained at a constant 17.5 rpm. Two subjects were completely resistant to symptoms of motion sickness when rotated at 2.5 deg off vertical; with greater off-vertical angles, the susceptibility of all subjects increased sharply at first, then tapered off in a manner reflecting a Fechnerian function. Author

**N74-18765\*** Toronto Univ. (Ontario).

**BRAIN BLOOD-FLOW CHANGES DURING MOTION SICKNESS**

Walter H. Johnson and John Hsuen / In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 105-107 refs

CSCL 06P

The possibility of diminished blood flow in the brain is studied as one of the factors resulting from an increase in skeletal muscle blood volume concomitant with other characteristics of motion sickness. Thermistors are implanted in the thalamus of dogs and blood flow changes are recorded while they are subjected to sinusoidal movement on a two pole swing. Results of these initial steps in a proposed long term exploration of different areas of the brain are presented. Author

**N74-18766\*** Louisiana State Univ., Shreveport.

**ANTI-MOTION-SICKNESS THERAPY**

Charles D. Wood / In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 109-114 refs

CSCL 06E

Neither alterations in environmental temperature nor moderate intake of alcohol was found to alter susceptibility to motion sickness in subjects exposed to rotation in the Pensacola slow rotation room. Scopolamine with d-amphetamine was found to be the most effective preparation for the prevention of motion sickness under the experimental conditions of the studies reported here. Promethazine in combination with d-amphetamine was in the same range of effectiveness. Drug actions suggest that acetylcholine and norepinephrine may be involved in motion sickness. Author

**N74-18767\*** Naval Aerospace Medical Research Lab., Pensacola, Fla.

**ARTIFACTS PRODUCED DURING ELECTRICAL STIMULATION OF THE VESTIBULAR NERVE IN CATS**

Pei Chin Tang / In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 115-123 refs

CSCL 06C

Evidence is presented to indicate that evoked potentials in the recurrent laryngeal, the cervical sympathetic, and the phrenic nerve, commonly reported as being elicited by vestibular nerve stimulation, may be due to stimulation of structures other than the vestibular nerve. Experiments carried out in decerebrated cats indicated that stimulation of the petrous bone and not that of the vestibular nerve is responsible for the genesis of evoked potentials in the recurrent laryngeal and the cervical sympathetic nerves. The phrenic response to electrical stimulation applied through bipolar straight electrodes appears to be the result of stimulation of the facial nerve in the facial canal by current spread along the petrous bone, since stimulation of the suspended facial nerve evoked potentials only in the phrenic nerve and not in the recurrent laryngeal nerve. These findings indicate that autonomic components of motion sickness represent the secondary reactions and not the primary responses to vestibular stimulation. Author

**N74-18768\*** Defence Research Establishment Toronto, Downsview (Ontario).

**THE VESTIBULAR SYSTEM OF THE OWL**

K. E. Money and M. J. Correia / In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 127-132 refs

CSCL 06C

Five owls were given vestibular examinations, and two of them were sacrificed to provide serial histological sections of the temporal bones. The owls exhibited a curious variability in the postrotatory head nystagmus following abrupt deceleration; sometimes a brisk nystagmus with direction opposite to that appropriate to the stimulus would occur promptly after deceleration. It was found also that owls can exhibit a remarkable head stability during angular movement of the body about any axis passing through the skull. The vestibular apparatus in the owl is larger than in man, and a prominent crista neglecta is present. The tectorial membrane, the cupula, and the otolithic membranes of the utricle, saccule, and lagena are all attached to surfaces in addition to the surfaces bearing hair cells. These attachments are very substantial in the utricular otolithic membrane and in the cupula. Author

**N74-18769\*** Stanford Univ., Palo Alto, Calif.

**THE ROLE OF PERILYMPH IN THE RESPONSE OF THE SEMICIRCULAR CANALS TO ANGULAR ACCELERATION**

Max Anliker and William VanBuskirk / In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 135-141 refs

A new model for the response of the semicircular canals to angular motion is postulated. This model is based on evidence that the bony canal is not compartmentalized and assumes that the ampulla wall is highly flexible. It is shown that the perilymph induces a cupula displacement far greater than that produced by the endolymph alone. The predicted dynamic behavior of the canals on the basis of this model is found to be consistent with experimental observations. Author

**N74-18770\*** Illinois Univ., Urbana.

**SCANNING ELECTRON MICROSCOPY OF THE VESTIBULAR END ORGANS**

Henrik H. Lindeman, Harlow W. Ades, and Roger W. West / In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 145-156 refs

CSCL 06P

The vestibular end organs, after chemical fixation, were freeze dried, coated with gold and palladium, and studied in the scanning microscope. Scanning microscopy gives a good three dimensional view of the sensory areas and allows study of both gross anatomy and microstructures. Cross anatomical features of the structure of the ampullae are demonstrated. The form of the statoconia in different species of animals is shown. New aspects of the structure of the sensory hairs are revealed. The hair bundles in the central areas of the cristae and in the striola of the maculae differ structurally from the hair bundles at the periphery of the sensory regions. Furthermore, some hair bundles consisting of very short stereocilia were observed. The relationship between the cupula and the statoconial membrane to the epithelial surface is discussed. Author

**N74-18771\*** Civil Aeromedical Inst., Oklahoma City, Okla.

**HABITUATION OF VESTIBULAR RESPONSES: AN OVERVIEW**

William E. Collins / In NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 157-193 refs

CSCL 06P

An historical survey of vestibular habituation experiments has been undertaken. Methodological problems are presented briefly, and the influence of arousal on vestibular responses is detailed. Data obtained from animals and from man are treated separately. At least for man, the term habituation may be better defined by a dynamic change in the form of vestibular responses than by a simple response reduction. Author

**N74-18772\*** Naval Aerospace Medical Research Lab., Pensacola, Fla.

**OTOLITHIC INFLUENCES ON EXTRAOCULAR AND INTRAOCULAR MUSCLES**

Bo E. Gernandt *In* NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 195-201 refs

CSCS 06P

Selective stimulation of utricular gravireceptors leads to gross activation of the bulbar reticular formation where a strong interaction with evoked spino-bulbo-spinal reflex activity occurs. The utricular neurons encountered by microelectrodes in the lateral vestibular nuclei show four types of elicited activity: two of these display an increased firing rate, and two exhibit pronounced inhibitory effects. Application of a stimulus of long duration and constant intensity to the utricle has shown that rapid adaptation of the peripheral receptors is a prominent feature. The effects of selective utricular stimulation upon eye movements, as recorded by the corneoretinal potential method, have been studied in experiments on cats and monkeys and it can be firmly stated that prolonged stimulation of the utricle can evoke strong primary nystagmus, followed by a secondary nystagmus at the cessation of stimulation. The action of utricular stimulation on ocular reflexes has been examined further, with particular attention to evoked pupillary reactions in both cats and monkeys: constriction during the fast phase of the brisk conjugate eye movement, and dilatation during the flow phase. Author

**N74-18773\*** Massachusetts Inst. of Tech., Cambridge.

**ON VISUAL-VESTIBULAR INTERACTION**

Laurence R. Young *In* NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 205-210 refs

CSCS 06P

Experimental evidence is presented regarding visual vestibular interaction, and the results of three studies on the subject are briefly noted. An attempt to put together some of these observations with elementary notions of a visual vestibular interaction program is shown in the form of a flow chart representation of a possible model. This is a nonlinear model in which visual and vestibular influences are linearly weighted when they are in relative agreement but switch to the more believable one when they are in disagreement. A solution to the human space orientation problem is depicted by a schema for optimal subjective orientation based on several sensory modalities. Author

**N74-18774\*** Naval Aerospace Medical Research Lab., Pensacola Fla.

**SUBJECTIVE AND NYSTAGMUS REACTIONS CONSIDERED IN RELATION TO MODELS OF VESTIBULAR FUNCTION**

F. E. Guedry, Jr., R. D. Gilson, and C. W. Stockwell *In* NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 211-219 refs Sponsored in part by Army Aeromed. Res. Lab. and NASA

CSCS 06P

Modelling will become increasingly important as more knowledge is accumulated, because it offers advantages in predicting reactions of individuals in a variety of situations, including novel aerospace environments, and in specifying a few parameters which should have considerable clinical significance. However, the need for continuing experimental crosschecks of these models has been illustrated by several sets of results which would not have been predicted by any existing models. Author

**N74-18775\*** Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

**RESPONSES TO ROTATING LINEAR ACCELERATION VECTORS CONSIDERED IN RELATION TO A MODEL OF THE OTOLITH ORGANS**

Alan J. Benson and Graham R. Barnes *In* NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 221-236 refs

CSCS 06S

Human subjects were exposed to a linear acceleration vector that rotated in the transverse plane of the skull without angular counterrotation. Lateral eye movements showed a sinusoidal change in slow phase velocity and an asymmetry or bias in the same direction as vector rotation. A model is developed that attributes the oculomotor response to otolith mechanisms. It is suggested that the bias component is the manifestation of torsion of the statoconial plaque relative to the base of the utricular macula and that the sinusoidal component represents the translational oscillation of the statoconia. The model subsumes a hypothetical neural mechanism which allows x- and y-axis accelerations to be resolved. Derivation of equations of motion for the statoconial plaque in torsion and translation, which take into account forces acting in shear and normal to the macula, yield estimates of bias and sinusoidal components that are in qualitative agreement with the diverse experimental findings. Author

**N74-18776\*** Politecnico di Milano (Italy). Lab. di Controlli Automatici.

**SYSTEMS ANALYSIS OF THE VESTIBULO-OCULAR SYSTEM**

Roberto M. Schmid *In* NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 237-249 refs

CSCS 06P

The vestibulo-ocular system is examined from the standpoint of system theory. The evolution of a mathematical model of the vestibulo-ocular system in an attempt to match more and more experimental data is followed step by step. The final model explains many characteristics of the eye movement in vestibularly induced nystagmus. The analysis of the dynamic behavior of the model at the different stages of its development is illustrated in time domain, mainly in a qualitative way. Author

**N74-18777\*** Chicago Coll. of Osteopathic Medicine, Ill.

**USE OF STEINHAUSEN'S MODEL FOR DESCRIBING PERIODIC CORIOLIS STAR NYSTAGMUS**

Maximo Valentinuzzi *In* NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 251-262 refs

CSCS 06P

Phase lag, maximal slow phase velocity, and beat frequency were measured in periodic Coriolis star nystagmus. The results have been described by Steinhausen's model of the semicircular canal system. Estimates of the biophysical constants have been obtained. It is concluded that this model is a good functional approximation for describing, and also for interpreting, the behavior of the system. Author

**N74-18778\*** Chicago Coll. of Osteopathic Medicine, Ill.

**USE OF LORENTE DE NO'S NEURON CIRCUIT MODEL FOR DESCRIBING ACCELERATORY NYSTAGMUS**

Maximo Valentinuzzi *In* NASA, Washington Fifth Symp. on the Role of the Vestibular Organs in Space Exploration 1973 p 263-272 refs

CSCS 06P

Results of a previous metric analysis and an electronic simulation of acceleratory nystagmus are given. On this basis, a tentative mathematical model for describing acceleratory nystagmus is reported. The essential content of the model is Lorente de No's neuron circuit, to which the two-factor theory of excitation has been applied. Author

**N74-18779#** Advisory Group for Aerospace Research and Development, Paris (France).

**CLINICAL PSYCHOLOGY AND PSYCHIATRY OF THE AEROSPACE OPERATIONAL ENVIRONMENT**

P. J. O'Connor, ed. (Roy. Air Force Central Med. Est.) Dec. 1973 68 p refs Presented at AGARD Aerospace Med. Panel Specialists Meeting, Soesterberg, Netherlands, 6 Sep. 1973 (AGARD-CP-133) Avail: NTIS HC \$6.50

Stresses inherent in the military aircrew role are summarized. Summary data cover life stresses, relationship of domestic stress to operational efficiency, and motivation. Data are also

given on structural anomalies of the brain and its effects on flying and phobic flight reaction. Several methods of treating psychiatric illness are included.

**N74-18780** Gaustad Mental Hospital, Oslo (Norway). EEG Research Inst.

**MENTAL AND PHYSIOLOGICAL ENVIRONMENTAL REQUIREMENTS IN MANNED FLIGHTS**

C. W. Sem-Jacobsen *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 6 p refs

A study was made of the training and maintenance of today's pilot with respect to his physiological and mental environment. Special attention was placed on a complete monitoring of pilots under operational conditions to map out his tolerance and requirements for full efficiency. E.H.W.

**N74-18781** Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

**FEAR OF FLYING AND ITS TREATMENT**

K. Gerbert and H. Oberholz *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 6 p refs

A clinical effort was made to treat and return to flying status, pilots in whom psychic, performance, and behavioral irregularities were cited. Particular attention was given to pilots with fear of flying. Treatment was based on quasi-therapeutic interviews, conflict centered counseling, physical exercise therapy, and individually directed flying rehabilitation programs. E.H.W.

**N74-18782** Royal Air Force Central Medical Establishment, London (England).

**RESULTS OF BEHAVIOUR THERAPY IN FLYING PHOBIA**

P. J. O'Connor, J. A. Lister, and J. W. Rollins *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 3 p

The treatment of military crews and pilots for flying phobia by behavior therapy is discussed. Treatment was divided into three series. In series 1 seven cases were treated. Only men who were highly motivated towards military flying and possessed a robust personality were selected. Sixteen consecutive cases were treated in Series 2. No selection was made, all personnel diagnosed as having flying phobia were admitted for treatment. After evaluating the results it was decided to revert to treating select cases. Series 3 had eight cases. All men selected because they had good prognosis for recovery. It was concluded that there is a better chance of improving a pilot with flying phobia to the point where he can fly training type aircraft than for getting him well enough to return to high performance aircraft.

Author

**N74-18783** Royal Air Force, Farnborough (England).

**ASSESSMENT OF BEHAVIOUR THERAPY IN THE TREATMENT OF FLYING PHOBIA**

A. B. Goorney *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 7 p refs

An accurate assessment of the effectiveness of behaviour therapy (or of any other therapeutic method) in the treatment of flying phobias is difficult due to lack of information. Nevertheless there is evidence to suggest that for selected cases behaviour therapy may be an effective treatment with a high percentage returned to full flying. Selection should be restricted to cases in whom anxiety is limited to a part of the total flying environment (focal anxiety). A mixed technique is suggested in which emotional control is regained through non-reinforcement.

Author

**N74-18784** Royal Air Force Central Medical Establishment, London (England).

**DEPRESSION IN AIRCREW**

P. J. O'Connor, A. W. Black, and J. W. Rollins *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ.

Dec. 1973 2 p

Treatment and disposal of depressive illness in air crews are analyzed. Common etiological factors of the illness are listed. Author

**N74-18785** Centre Medical de Psychologie Clinique de l'Armée de l'Air, Paris (France).

**CLINICAL STUDY OF LOSS OF AERONAUTICAL MOTIVATION [ETUDE CLINIQUE DES PERTES DE MOTIVATION AERONAUTIQUE]**

R. Gelly *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 4 p *In* FRENCH

Factors accountable for the loss of motivation or interest in flying by military crew trainees are examined. Some of the motivation loss was attributed to: social and flight stress, expectations of trainee not met during training period, and psychological and psychiatric aptitude of trainee is exceeded by training. Transl. by E.H.W.

**N74-18786** Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

**PARTIAL CEREBRAL HYPOXIC ATTACKS IN PILOTS AS CAUSE OF HYPOXIA INCIDENTS**

H. Oberholz *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 4 p refs

Screening methods for detecting and avoiding as well as determining the causes of cerebral hypoxic attacks in pilots during flying missions are introduced. Special attention was given to anomalies and variants of brain arteries, especially the Circle of Willis as the possible source of the attacks. Two case histories along with symptoms of the attacks are outlined. It was concluded from the data that the Circle of Willis in combination with hypoxia, low G forces, mental stress, extreme heat, and any kind of exhaustive or vestibular stimuli cause cerebral attacks. E.H.W.

**N74-18787** School of Aerospace Medicine, Brooks AFB, Tex. Neuropsychiatry Branch.

**CHARACTERISTICS OF LIFE STRESS IN A POPULATION OF MILITARY AVIATORS**

Carlos J. G. Perry and John W. Gaines *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 2 p

A description is given of a military aviator population with respect to the occurrence of life stress events in its individual members. Questionnaires, inventories, and checklists were deliberately avoided to emphasize a broad range of freedom for the interviewer. During the course of such an interview life stress events were discovered that are missed by questionnaires. This was especially true of anniversary stress which was revealed only through persistent, patient questioning. A total of 320 life stress events were found during the study. Job stress was most frequently represented with personal health, marital, and parental relationships following in order of frequency. Author

**N74-18788** Centre de Medecine Aeronautique, Brussels (Belgium).

**SELECTION OF STUDENT PILOT CANDIDATES OF THE BELGIAN AIR FORCE BY PSYCHOMOTOR TESTS [SELECTION DES CANDIDATS ELEVES-PILOTES DE LA FORCE AERIENNE BELGE PAR DES TESTS PSYCHO-MOTEURS]**

J. Clement and J. Pardaens *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 11 p refs *In* FRENCH

The predictive value of psychometric tests in investigating a sample of 413 student pilots and determining their fitness as future pilots is reported. The tests are used in conjunction with a linear method to select candidate student pilots. Results of the tests are given in tables and graphs. Transl. by E.H.W.

**N74-18789** Centre de Medecine Aeronautique, Brussels (Belgium).

**PERSONALITY TRAITS AND FLIGHT APTITUDE [TRAITS DE PERSONNALITE ET APTITUDE AU VOL]**

VanMassenhove and Flion *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 8 p *In* FRENCH

Szondi's psychological testing method was used to determine the fitness and flight aptitude of student pilots. In particular an attempt was made to determine personality traits and correlate them with flight aptitude. Seventy nine student pilots were tested using two groups designated as Group A and Group B. Group A students were just entering training and Group B students were ending their training. A comparison was made of the two Groups' response to different flight environments. Detailed results are given in graphs. Transl. by E.H.W.

**N74-18790** Italian Air Force Aerospace Medical Center, Rome.

**IN-FLIGHT PSYCHIC LOAD IN STUDENT-PILOTS, EVALUATED BY MEANS OF VANIL MANDELIC ACID (VMA) CHANGES IN URINARY EXCRETION**

G. Paolucci and G. Blundo *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 2 p refs

Sixty four air cadets were tested for in-flight psychic load and anxiety crises by vanil mandelic acid content in the urine. The tests were made in an effort to determine possible preexisting stress and the measurement of its degree. It was suggested that VMA content is proportional to the amount of stress, and that this method should be included in tests for selecting pilots. Author

**N74-18791** Royal Netherlands Air Force the Hague.

**INFLUENCE OF SOCIAL/RELATIONAL FACTORS ON OPERATIONAL FLYING CAPACITY: A SYSTEM-ORIENTED APPROACH**

H. Merkus and J. J. VanderMaas *In* AGARD Clin. Psychol. and Psychiat. of the Aerospace Operational Environ. Dec. 1973 5 p refs

The effectiveness of the psycho-social approach to treating military pilots with psychological problems or symptoms of such problems is examined. After an explanation about the viewpoints of the psycho-social model, a description is given of how the model is made applicable in psychiatric practice. Three case histories are presented to illustrate the use of the model. Author

**N74-18792#** Bureau of Mines, Bartlesville, Okla. Energy Research Center.

**HAZARD FROM ENGINES REBREATHING EXHAUST IN CONFINED SPACE**

W. F. Marshall and R. W. Hurn 1973 20 p (BM-R1-7757) Avail: NTIS HC \$4.00

A series of experiments to determine the influence of exhaust rebreathing on emissions from various gasoline and diesel engines is reported. Tests were conducted that simulated operation of engines in nonventilated spaces as well as in spaces with partially restricted ventilation. Results of these tests show that exhaust rebreathing can have a marked effect on exhaust emissions and thus on the composition of the air in the working space. For the case of restricted ventilation, unacceptably high (greater than 50 ppm) levels of CO in the air of the working space resulted from exhaust rebreathing rates as low as 8 pct exhaust in the engine's intake. Operation in a nonventilated space resulted in highly critical CO levels (fatal in a few minutes) at times corresponding to 1 to 3 pounds of fuel consumed per 1,000 cu ft of space. Tests involving spaces of various sizes showed that volume of the air space per se is not important--the primary variable is fuel consumed per unit volume of air space. Author

**N74-18793#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**INFORMATION THEORY OF NEURAL NOISE IN HEARING**  
R. E. Rink 1973 16 p refs Repr. from Mathematical Biosci., v. 16, 1973 p 129-142

(AF Proj. 7233)

(AD-760372; AMRL-TR-68-137) Avail: NTIS CSCL 05/10

The information capacity of the peripheral auditory system, as limited by the neural noise effect, is computed. The cochlear patterns are taken to be continuous space-time surfaces, with parameters of characteristics length and characteristic time as estimated from mechanical and synaptic transfer functions. The output messages are taken to be the sets of spike counts from small, optimally-dimensional subdivisions of the space-time domain on the auditory nerve. The computed upper and lower bounds on capacity are 5160 and 8500 bits/sec, respectively, in agreement with a previous determination which was based on psychoacoustic measurements of difference limen and masking distance. The agreement implies that the limitation on capacity is peripheral rather than central, and that the physiological phenomenon of neural noise accounts for the psychoacoustic phenomena of limited acuity of hearing. Author (GRA)

**N74-18794#** Army Edgewood Arsenal, Md.

**INTERACTIVE EFFECTS OF HEAT LOAD AND RESPIRATORY STRESS ON WORK PERFORMANCE OF MEN WEARING CB PROTECTIVE EQUIPMENT** Technical Report, Jun. 1971 - Nov. 1972

Arthur T. Johnson and Howard M. Berlin Dec. 1973 35 p refs

(DA Proj. 1W6-62710-A-095)

(AD-771931; ED-TR-73059) Avail: NTIS CSCL 06/19

Interaction between the effects of respiratory stress and thermal stress has been objectively identified. Analyses of data on distance run, percentage of inspiration at termination, and respiration rate at termination indicate the low value of resistance, 0.1 mm H<sub>2</sub>O-min/liter, to be the point at which interaction occurs. The heat load value causing interaction is somewhat equivocal. A model has been proposed which is consistent with our results and which defines the stress limitations for different rates of exercise. With the use of this model, the value of 0.1 mm H<sub>2</sub>O-min/liter has been objectively defined as the minimum effectual protective mask airflow resistance. Evidence is presented for exhalation time as the index of the respiratory stress limitation. Author (GRA)

**N74-18795\*#** Techtran Corp., Glen Burnie, Md.

**PROBLEMS OF SPACE BIOLOGY. VOLUME 24. THE WATER SUPPLY OF SPACECRAFT CREWS**

S. V. Chizhov and Yu. Ye. Sinyak Washington NASA Mar. 1974 262 p refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii. Tom 24: Vodoobespecheniye Ekipazhey Kosmicheskikh Korably" Moscow, Nauka, 1973 268 p (Contract NASw-2485)

(NASA-TT-F-15164) Avail: NTIS HC \$16.25 CSCL 06K

Some form of water recycling or regeneration will be required aboard spacecraft on planetary exploration missions. Various methods of recapturing water from moisture-containing products of human vital activity (feces, urine, sweat) and recycling water used for sanitary and hygienic purposes are examined. The use of ion-exchange resins and absorbent materials, as well as semipermeable membranes is discussed. The problems involved in decontaminating and deodorizing recycled water are examined in detail. Author

**N74-18796\*#** Systems Control, Inc., Palo Alto, Calif.

**A PREDICTIVE PILOT MODEL FOR STOL AIRCRAFT LANDING** Final Report

David L. Kleinman and William R. Killingsworth Washington NASA Mar. 1974 130 p refs (Contract NAS1-11727)

(NASA-CR-2374) Avail: NTIS HC \$4.75 CSCL 05E

An optimal control approach has been used to model pilot performance during STOL flare and landing. The model is used to predict pilot landing performance for three STOL configurations, each having a different level of automatic control augmentation. Model predictions are compared with flight simulator data. It is concluded that the model can be effective design tool for studying analytically the effects of display modifications, different stability augmentation systems, and proposed changes in the landing area geometry. Author

**N74-18797#** Advisory Group for Aerospace Research and Development, Paris (France).

**BEHAVIOURAL ASPECTS OF AIRCRAFT ACCIDENTS**

K. G. G. Corkindale, ed. (Inst. of Aviation Med.) Dec. 1973 72 p refs Papers presented at AGARD Aerospace Med. Panel Specialists Meeting, Soesterberg, Netherlands, 7 Sep. 1973 (AGARD-CP-132) Avail: NTIS HC \$6.75

A conference was conducted to discuss the influence of human factors on aircraft accidents. The subjects discussed were: (1) human factors approach to aircraft accident analysis, (2) human factor in cyclic aircraft accident patterns, (3) the application of aircrew opinions on cockpit tasks and equipment to flight safety research, and (4) the psychologists's role in aircraft accident investigation. The primary purpose of the conference was to determine if research projects in human factors engineering could result in a reduction in the pilot error accident rate.

**N74-18798** Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

**PILOT FACTOR IN AIRCRAFT ACCIDENTS OF THE GERMAN FEDERAL ARMED FORCES**

B. Falckenberg /in AGARD Behavioural Aspects of Aircraft Accidents Dec. 1973 7 p refs

An analysis with reference to the most frequent types of pilot error was made of 154 aircraft accidents which occurred in the years between 1967 - 1970. Of special interest were differences between pilots of jet, propeller aircraft and helicopters. The flying experience of the pilot, his age and other so called time-variable factors were also taken into consideration. In general, errors predominantly occurred during low level flight and during the landing phase immediately before touch-down. In jet aircraft accidents the majority of errors committed by the pilot is due to an extreme workload in handling his aircraft. In pilots of the other categories, particularly on propeller-driven aircraft, those types of errors are more pronounced which may be attributed to the pilot's flying attitude (in extreme cases resulting in violations). The findings of other authors relating to flying experience could be confirmed. As for the age distribution of pilots there were remarkable differences in comparison with the data in other publications. Author

**N74-18799** Naval Aerospace Medical Research Lab., Pensacola, Fla.

**HUMAN FACTORS APPROACH TO AIRCRAFT ACCIDENT ANALYSIS**

Richard H. Shannon and Wayne L. Waag /in AGARD Behavioural Aspects of Aircraft Accidents Dec. 1973 10 p refs

Naval accident reports involving the P-3 and F-4 aircraft were examined over seven and five year periods, respectively. The critical incident technique was used to catalogue, describe, and analyze operational flight crew errors in both aircraft. An in-depth study was performed in order to identify those problems which were common as well as specific to both aircraft. The P-3 and F-4 aircraft were selected because of their completely different fleet missions and handling characteristics. Human errors were categorized according to three types: (1) vigilance errors; (2) procedural errors; and (3) perceptual motor errors. Phases of flight operation were divided into four segments: (1) servicing/preflight/postflight; (2) start/taxi/shutdown; (3) takeoff/landing; and (4) inflight. Four remedial areas were outlined for reducing human error: (1) crew coordination; (2) design; (3) discipline; and (4) training. From the F-4 accident reports, 437 human errors were isolated while the P-3 reports contained 345 errors. Twenty-eight major error categories emerged from the analysis of these errors. The accident reports were further analyzed for the errors which both aircraft had in common. Twenty common error groups were found to occur in the P-3 and the F-4, representing 22.9% and 18.8% of the total errors, respectively. The flight segment of takeoff/landing, and the error type of procedures, shared the most commonality across the two aircraft. Author

**N74-18800** Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).

**THE HUMAN FACTOR IN CYCLIC AIRCRAFT ACCIDENT PATTERNS**

Peter J. Dean /in AGARD Behavioural Aspects of Aircraft Accidents Dec. 1973 8 p refs

An analysis of the human factors in aircraft accidents was conducted to isolate cyclic human factors which cause the accidents. The operational record of the CF-104 aircraft was used for the analysis. It was determined that the accidents tend to occur more frequently in January, April, July, and October than in the other months. The subjects discussed are: (1) the nature of the cyclic phenomena and how they influence man, (2) previous studies of cyclic patterns in aircraft accidents, and (3) specific cyclic factors related to aircraft accidents and recommendations for preventing aircraft accidents. Author

**N74-18802** Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

**THE APPLICATION OF AIRCREW OPINIONS ON COCKPIT TASKS AND EQUIPMENT TO FLIGHT SAFETY RESEARCH**

J. M. Rolfe and J. W. Chappelow /in AGARD Behavioural Aspects of Aircraft Accidents Dec. 1973 5 p ref

A study was conducted to determine the impact of flight crew opinions on flight tasks and aircraft equipment on aircraft accidents which could be related to personnel error. The areas of investigation were: (1) the load imposed on the flight crew in the performance of their duties and (2) the compatibility between the aircraft equipment and the human limitations and abilities. Tables of data are provided to show the results of a questionnaire submitted to flight crew personnel. Author

**N74-18803** Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

**THE PSYCHOLOGIST'S ROLE IN AIRCRAFT ACCIDENT INVESTIGATION**

M. F. Allnut /in AGARD Behavioural Aspects of Aircraft Accidents Dec. 1973 6 p

The contributions to be made by psychologists in the reduction of human error aircraft accidents are discussed. Specific areas of cooperation are identified as: (1) analysis of human error accident data, (2) research on human factor aspects of flight safety, and (3) assist in determining the causes of specific aircraft accidents. The advantages of using psychologists in the aircraft accident investigation are reported. Author

**N74-18804** Army Agency for Aviation Safety, Fort Rucker, Ala.

**INCIDENCE, COST AND FACTOR ANALYSIS OF PILOT-ERROR ACCIDENTS IN US ARMY AVIATION**

Darwin S. Ricketson, Scott A. Johnson, Larry B. Branham, and Richard K. Dean /in AGARD Behavioural Aspects of Aircraft Accidents Dec. 1973 19 p refs

From 1958 through 1972 pilot-error was a consistently large and costly cause of accidents. Past analytic and prevention efforts have not approached pilot-error accidents in the context of malfunctions among the basic man-machine-environment elements. Such an approach was proposed and seeks to identify the common human-error events in pilot-error accidents. A partial test of this approach was made with helicopter and airplane mishap information in its present form. A factor analysis produced nine distinct, meaningful and representative helicopter and airplane factors. A component score analysis yielded pilot and mishap background information which was helpful in interpreting the factors. An experimental human-error events reporting form was developed which holds promise for clearer identification of mishap-causing system elements and corrective measures required. Author

**N74-18805\***# National Aeronautics and Space Administration.  
Ames Research Center, Moffett Field, Calif.

**SHOULDER HARNESS AND LAP BELT RESTRAINT SYSTEM**  
**Patent Application**

Albert P. Garavaglia and Dennis S. Matsuihiro, inventors (to NASA)  
Filed 19 Mar. 1974 9 p  
(NASA-Case-ARC-10519-2; US-Patent-Appl-SN-452767) Avail:  
NTIS HC \$4.00 CSCL 06Q

A shoulder harness and lap belt restraint system are reported wherein the lap belt is combined with the shoulder harness in such a manner that a single fastening suffices to fasten both the shoulder strap and the lap belt. NASA

**N74-18806#** Politecnico di Torino (Italy). Ist. di Meccanica Applicata.

**ARTIFICIAL VOLUMETRIC RESPIRATOR WITH PROGRAMMABLE CYCLE [RESPIRATORE ARTIFICIALE VOLUMETRICO A CICLO PROGRAMMABILE]**

G. Belforte Jun. 1972 20 p refs In ITALIAN Presented at 1st Convegno Mostra di Bioingegneria, Milan, 19-24 Jun. 1972 (Rept-608) Avail: NTIS HC \$4.00

An artificial respirator is described which is either completely automatic, or assists the patient in breathing, on command from the patient. The command is obtained with a fluid circuit which assures a stable and safe operation. The construction of a prototype respirator is described, and the auxiliary and safety systems are analyzed. Transl. by F.O.S.

**N74-18807#** Advisory Group for Aerospace Research and Development, Paris (France).

**MATHEMATICAL MODELS OF HUMAN PILOT BEHAVIOR**

Duane T. McRuer (Systems Technol, Inc., Hawthorne, Calif.) and E. S. Krendel (Pa. Univ.) Jan. 1974 83 p refs  
(AGARD-AG-188; AGARDograph-188) Avail: NTIS HC \$7.25

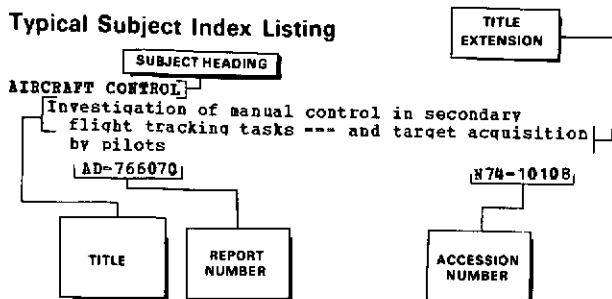
Mathematical models of the human pilot are used for analyses of the pilot/vehicle system. Elementary concepts and specific physical examples are used for a step-by-step development of what is known about the human pilot as a dynamic control component. In the process, quasi-linear models for single-loop systems with visual stimuli and multiloop systems with visual stimuli are presented and then extended to cover multiloop, multi-modality situations. Empirical connections between the pilot dynamics and pilot ratings are also considered. Nonlinear features of human pilot behavior in adapting to changes in the character of the stimuli are described and tied to the quasi-linear models via the successive organization of perception (SOP) theory, which is reviewed and elaborated. Dual-mode control models needed to describe the pilot's behavior in response to sudden transients are presented, along with pursuit and compensatory elements of the SOP continuum. The current status of mathematical pilot models is shown to cover random, random-appearing, and transient inputs for single- and multi-loop system configurations. A bibliography of applications and a summary of analysis problems is included. Author

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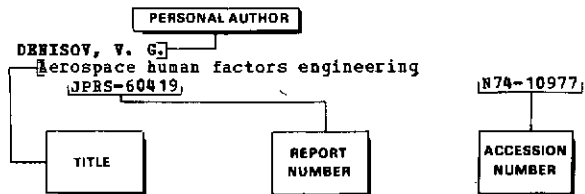
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